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March 11. 1872

THE

PATHOLOGY AND THERAPEUTICS

OF

MENTAL DISEASES.

1872

BY

J. L. C. SCHROEDER VAN DER KOLK,

PROFESSOR OF PHYSIOLOGY IN THE UNIVERSITY OF UTRECHT.

Thurtell)
March 11.

TRANSLATED FROM THE GERMAN BY

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SURGEON TO THE MELBOURNE HOSPITAL; SURGEON TO THE VICTORIAN
ASYLUM AND SCHOOL FOR THE BLIND, ETC.

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TRANSLATOR'S PREFACE.

Circumstances, several years ago, led the translator to a study of the morbid anatomy of mental insanity; and, in the course of his reading, he was much impressed by the originality and clearness of this treatise of the late PROFESSOR SCHROEDER VAN DER KOLK, *especially in regard to cerebral physiology and pathology. It is fortunate that the laudable desire for knowledge of two medical students (one of whom, Dr. F. A. Hartsen, has since so well fulfilled the duty of editing the memoir of his honoured teacher) should have induced Schroeder van der Kolk to take in hand the work which he had in view, but which, nevertheless, might else not have been accomplished. Through the kind intervention of Professor Miquel, the English translation appears, with the sanction of Dr. H. W. Schroeder van der Kolk, son of the lamented author, and also with the permission of Messrs. Vieweg, the well-known medical publishers of Brunswick. The translator desires to express his thanks to Dr. H. W. Schroeder van der Kolk, and to the Messrs. Vieweg; and he also very gratefully acknowledges the revision of the manuscript by his distinguished friend, Dr. F. von Mueller, C.M.G., F.R.S. The translator regrets the delay which has occurred in publication, but trusts that those who are, like himself, engaged in the duties of surgical practice, will make allowance for the numerous interruptions to which, with such avocations, a task of this kind must of necessity be subjected.*

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MELBOURNE, *June*, 1869.

MELBOURNE:
PRINTED BY WALKER, MAY AND CO.,
99 BOURKE STREET WEST.

PREFACE.

THE Utrecht Professor, J. L. C. Schroeder van der Kolk (the renovator of the Dutch Institution for the Insane), whose death took place early in May, 1862, was long occupied with the plan of comparing together his physiological studies and his practical experience of mental diseases in order to lay them before the public. But as so often happens in life, he yet needed some special inducement to enter upon the work, and the occasion presented itself in the autumn of 1861, when two students of medicine in Utrecht, Herr P. Templeman van der Hoeven, and the undersigned, from the want of a psychiatric clinic at our University, betook themselves to Schroeder van der Kolk, with a request to be introduced under his guidance into the domain of Mental Diseases.

He readily acceded to our request, and immediately arranged that we should come to his study twice a week, when he would read to us what he had elaborated for his book, and converse with us thereupon.

We have thus seen the book arise, have recognised its object, and we are aware of the value the author set on it, and of how much time and trouble it had cost him.

He accomplished the undertaking with assiduous zeal, as if he felt that his career was hastening to its end, and that he must bestir himself to complete the crowning work of his literary activity. Death, indeed, overtook him while engaged in this labour, but he previously expressed his wish that the work should be published.

My friend, Dr. H. W. Schroeder van der Kolk, then paid me the compliment of entrusting to me the fulfilment of his father's wish.

On account of the haste with which the material had been put together, alterations were repeatedly necessary, not only of single expressions but sometimes of whole sentences, whereby however, as little damage as possible has been done to Schroeder van der Kolk's style. The work, indeed, was not yet entirely finished (for example, in the paragraph on the cerebellum, I found two empty pages, and the author manifestly intended to add something here), indeed its therapeutical part was not even commenced. It was possible to supply this last want by two treatises of Schroeder van der Kolk's, of which one was published in the *Tydschr. der Nederl. Maatschappy van Geneeskunde* (1852) and the other was found among the papers of the deceased.

Such is the origin of this work, in which the material basis of our spiritual activity is authenticated by facts; but, also, at the

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same time, the belief in a continuation of man's existence after dissolution of the body is guarded as his undoubted right. It furnishes what is for many, a not at all superfluous demonstration, that no anatomico-physiological researches whatever, can in any way overthrow the data derived from the moral ordering of the world, and that no danger is connected therewith, if, to the usually calumniated materialism, its claim is accorded.

Dr. F. A. HARTSEN.

Utrecht, *April*, 1863.

In the translation of this posthumous work, I have permitted myself, quite without detriment to the subject matter, to make several slight and also some more considerable formal alterations and abbreviations which German language and science appeared to require, although the editor, probably from reverence, had allowed the original to stand unaltered. To make up for these abbreviations, I will, in this place at least, add a completion which I extract from a letter of 21st November, 1861, the last which I ever received from the excellent Schroeder van der Kolk. He communicated to me that he was writing on the physiology and pathology of the brain, and that in my treatise on microcephalon he had found a further confirmation of his opinion on the relation between the anterior and posterior lobes of the brain, which are separated from one another by the gyrus centralis. That view was based partly on measurements which he had prosecuted on the illustrations furnished by Rud. Wagner (*Treatise on the Typical Varieties of the Convolutions of the Hemispheres*):—"I took," says he, "fine letter-paper on which squares were inscribed, drew the representations through them, then counted how many squares the lobus anterior before the gyrus centralis A A, and how many squares the lobus posterior behind the gyrus had, and obtained the following results:—

	Lob. ant.		Lob. post.				
Gauss, Taf. v., fig. 1	154	:	174	=	88,5	:	100
Dirichlet, Taf. v., fig. 2	203	:	203	=	100	:	100
Philologist Hermann, Taf. v., fig. 3 ..	152	:	202	=	75	:	100
Artisan Krebs, Taf. v., fig. 4 ..	142	:	206	=	69	:	100
Young Ourang-Utang, Taf. v., fig. 5	138	:	224	=	57	:	100
Idiot, Taf. vi., fig. 2	260	:	504	=	53	:	100
Microcephalus	92	:	191	=	48	:	100

"It is understood that this gives only a relative value, and a relative accuracy, for I measure the plane and not the arched surface, but after all, that occurs in a tolerably equal degree in all the measured brains. I am convinced it would lead to good results, if comparisons were made in this way, between the brains of persons of talent and those of less mental capacity."

Dr. THEILE.

Weimar, 18th *May*, 1863.

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ERRATUM.

Page 31, lines 16 and 17, *for*—“on account of their course through *long* canals,” *read*—“on account of their course through *bony* canals.”

INTRODUCTION.

THE doctrine of insanity is indeed that part of medical science on which may yet be heard the most varying judgments, and which still rests on the most insecure foundation. This is not surprising. This section of pathology has to deal with mental disturbances where the most important pathological phenomena display themselves almost only by the altered mode of action of the mental faculties, whilst the state of the body is often apparently not at all impaired. If asked for the connecting link between body and mind, we might reply that we must almost give up the hope of ever here discovering a satisfactory solution of so deeply hidden a mystery. The difficulties which oppose themselves to the clearing up of the concealed indications of the *Ego*, are yet increased by the imperfection of our knowledge as to the functions of different parts of the brain. For although the brain has been most accurately investigated by anatomists, and has been described in its minutest details, yet for a long time Richerand's assertion held good, that the anatomist finds himself here in the same case as the Parisian porter, who knows, indeed, all the streets and alleys, even to the smallest, but does not know what happens in the houses.

When so little was known of the functions of different parts of the brain, it was a matter of great difficulty to arrive at an understanding of the pathological phenomena through *post-mortem* examinations of those who had suffered from mental diseases. But only rarely have we been fortunate enough to bring the phenomena observed during lifetime, into relation with the often insignificant changes which the section displayed, and to interpret the one by the other. A clearer view into this obscure territory seemed to be excluded by the observations repeatedly made, that very important lesions of the brain, such as collections of matter, more or less extensive loss of substance, and so forth, might occur, without the intellectual powers of the affected individual sustaining damage thereby.

Just as uncertain as on the connection between mind and brain, were we also on the relation between the rest of the body and the mind. The most superficial observation of temperament, period of life, and many psychical affections, speak, indeed, plainly enough in favour of such a relation, yet, did it always appear problematical in what way the body is enabled to exert an influence on our mind. Although in mentally affected patients there were found many deviations from a healthy state, which appeared to stand in a certain relation with the disease, for example, costiveness, or obstruction of the bowels, menstrual disturbances, yet was it not always easy to decide what was cause or what was effect of the disease: still less could the inconstant pathological conditions, which are met with in the bodies of the mentally affected, be brought into a causal connection with the disturbances of the mental faculties.

As many pathological changes are met with in the thoracic and abdominal organs in the bodies of the insane, the difficult question arises, which of these alterations are only accidental or secondary, and what others stand in more direct causal connection with the insanity? But the somatic lesions are during life generally so much the less observed, because most of the insane consider themselves quite healthy, or are so accustomed to mix up their morbid perceptions with their confused ideas, that the physician who does not understand their manner of expressing themselves, can often obtain only very little information.

If, then, we were so much in the dark as to the real nature of mental diseases, it was natural that a secure foundation for therapeutical treatment should be wanting, and we limited ourselves to contend merely against the symptoms which especially struck the eye.

The most striking and most constant manifestations, then, are disturbances of the mental capability, and of the power of thought, with which are combined only insignificant morbid symptoms in the rest of the body, and indeed these symptoms may be entirely wanting. Therefore could it occur, that many physicians, holding to the psychical manifestations, preferred to see in insanity an injury of the mind, rather than a somatic affection which operated by disturbing the brain and through it, the mental faculty. Upon this assumption, the therapeutics must be limited to psychical influences, that is to say, we must try to act on the disposition and understanding of the insane, and endeavour by diversion or persuasion to give a better direction to their perverted ideas, but we should only have recourse to remedies upon the occurrence of an accidental corporeal indisposition, or when a threatening symptom makes its appearance.

Other physicians, it is true, found this view too onesided; they supposed that insanity like other diseases, has its origin in the bodily organism and its pathological affections, and this view gained firmer ground through the lately-acquired knowledge of the functions of the brain, especially also through better explanation of the pathological changes occurring in it. Therewith must also a more pharmaco-dynamic treatment of the insane take effect, especially as people began no longer to set them in dark corners, and like malefactors in chains and fetters, but rather made them accessible to observation in judiciously directed institutions, and treated them with attention and humanity. As, however, opinions on the nature of insanity were so widely different, and as such opposite points of view were firmly held in explanation of the phenomena, so it resulted that the bodily treatment must be more empirical than rational. The secure foundation for the therapeutics of mental diseases was wanting, and especially the young physician in this conflict of opinions could find no support for a safe treatment.

I attribute it principally to this, that even at present, the psychical theory and psychical therapeutics have a marked preponderance in the domain of mental disease. If we compare the different hand-books on mental diseases, not excluding the latest which have appeared not only in Germany but also in France and England, we shall find that very bulky sections with numerous subdivisions have been filled with detailed theoretical considerations on the multifarious affections and anomalies of the mental faculties, while to the practical therapeutics generally only a couple of leaves are devoted, in which we are usually limited to general therapeutical rules. The beginner now knows not in the concrete case, what symptoms he shall for the most part regard, and in what manner he can most surely obtain the recovery of his patient. But an error here may easily lead to this, that an insane patient, who under the treatment of a physician, operating on a secure basis, especially in the commencement of his malady, might yet be saved, is lost for ever, and becomes a burden in the most unhappy condition to human society.

Nevertheless, the reproach of partiality would be perfectly well-founded, if the physician should forget entirely the psychical management in mental diseases, such as, for example, the removal of former hurtful circumstances, the leading away to a correct train of thought, kind exhortations, also diversion by work and bodily exercise. The physician is here in a better position than with respect to many other diseases, inasmuch as two powerful factors and means for restoration stand at his command. As insanity, in its different forms, increases, especially through disturbance or interruption of the regular train of thought, so may he by amusements, by appropriate conversation, and active treatment, draw away the mind from noxious influences, and by helping it to a better judgment, enable it to regain its lost dominion over the body, and to subdue the passions. In that he will best succeed if he has previously, by carefully estimated medical treatment, removed, or at least lessened, those disturbing influences and pathological conditions. The maniacal patient has lost the dominion over his passions, the melancholic is no longer able to hold his gloomy ideas in check, and both are slaves of their psychical affections. Both methods of treatment must take effect together, yet must the pharmaco-dynamic lead the way, and prepare the patient for the psychical influences. If, with a raging maniac, we seek to quiet the cerebral irritation by violent coercive measures, and active means of restraint, instead of by appropriate remedies and prudent resistance, what result can this have but a greater excitement and an augmentation of wrath? If the insane patient, especially the melancholic, is firmly convinced of the truth of his erroneous ideas, then all persuasions and remonstrances through which he should be assured of his error, only assist in strengthening his obstinacy and suspicion, and even excite in him the belief that he is everywhere surrounded by enemies and secret foes, who only wait for an opportunity to destroy him. Firmly convinced of the truth of his erroneous ideas, he imagines himself easily misunderstood, even by those on whom as dear relatives and friends he was accustomed to bestow his confidence. Can we then wonder, if through such ill-timed exhortations, the physician forfeits the confidence of the patient? We must only set ourselves in the condition and mode of thought of the patient himself, and figure to ourselves what we should do, if we were persuaded of the truth of our imaginations, and all our friends suddenly opposed us with a continual contradiction. We should believe in an inexplicable conspiracy, a secret object, and should wish to be freed from the opposition; very readily would we open our ear to a stranger who would speak with us of quite other things, and divert our thoughts from that discovery.

It thus depends on the knowledge of men and judgment of the physician, who must ever know how to modify the psychical treatment according to the different conditions of the patient.

At the same time, the physician must be thoroughly familiar with the different organic operations which may also be present in pathologically-altered brains;—this, an accurate knowledge of the nervous system and of the organisation of the brain, presupposes;—and likewise an understanding of the influences exercised on the brain through the other parts of the body. But as the other branches of medical science are based on accurate knowledge of the organisation and functions of the healthy organism, so does this hold good also in the various forms of insanity, wherein so great a part is played, both by the functions of the brain and also by the influences of the organism exerted on it.

I therefore deem it necessary to prefix a consideration of the brain and nervous system to the Pathology of Mental Diseases, but I shall assume the rough anatomical relations to be known, and shall no further enter upon their description.

PATHOLOGY AND THERAPEUTICS OF MENTAL DISEASES.

CHAPTER I.

PHYSIOLOGICAL ANATOMY OF THE BRAIN.

SECTION 1.—*General Survey.*

WITHOUT doubt, to give an explanation of the functions of the brain is among the most difficult problems of physiology. In all times have the most acute thinkers industriously sought to inquire into this subject. They were, however, more or less impeded by the thick veil wherewith Nature has here concealed her secrets.

Various means have been employed in order to clear up this dark territory. Quite arbitrarily a *sensorium commune* was assumed, in which the soul had set up its throne, whence all impressions were conducted onwards, and by which all commands were imparted. Descartes placed the seat of this in the pineal gland, Vieussens in the centrum semicirculare, named after him, even Soemmerung in one of the cavities of the brain. Later physiologists strove for the solution of the problem through vivisections, and Flourens (*Recherches expérimentales sur les propriétés du système nerveux:* Paris, 1824), as well as his successors, believed at least that this much might be concluded, that the proper mental functions must be referred particularly to the great brain. A deeper penetration into the hidden laboratory of nature was herein rendered difficult by the circumstance, that our judgment of the feelings of animals is uncertain, and consequently the phenomena occurring after mutilation of different parts of the brain are only obscure and imperfect answers. One got conjectures as to the use of different parts of the brain, and formed hypotheses out of them.

Others sought through comparative investigation of the brain in different animals, and through comparison of the life manifestations (*Lebens-äusserungen*) connected with different brain organisation, to arrive nearer to a solution of this question. But inasmuch as the perceptions, or intellectual activities, of the animals are entirely unknown, so neither in this way could the surrounding veil be removed.

Further, it was endeavoured through a comparison of clinical observation with the accurately investigated anatomical lesions of the brain, to obtain explanation, but likewise without success. For we meet with very different pathological alterations of the brain, where, in one case most severe and considerable symptoms of disease preceded death, but in another case scarcely a morbid symptom had appeared during life. Indeed we only need to compare the long list of cases which Burdach (*Structure and Life of the Brain*, third part) has put together, to become convinced that these clinico-anatomical investigations, which also for the most part cannot lay claim to great accuracy, rather tended to cause obscurity and confusion, than to clear up the view as to the functions of the brain.

Availing myself of whatever, in any of the before-mentioned ways, has become known as reliable, or even as probable, and at the same time drawing in the microscopical elucidations of the minute structure of the spinal cord and the brain, and the connection of their elements, I have trodden another path, and have sought as far as possible to put the simplest questions to Nature. Behind the entirely simple, Nature, indeed, often conceals her secrets, and a search after the complicated will probably help to confuse us, and to put us on a false track.

EMBRYONIC DEVELOPMENT OF THE BRAIN.

Section 2.—*Development of the Brain in the Embryo, compared with its different forms in the Animal Kingdom.*

It is known that the embryonal brain proceeds from the same simple forms in which we find it persistent in the lower animals, and upon this especially rests the proposition, that a fixed type lies at the groundwork of the vertebrate kingdom, whose development gradually advances from the fishes up to man, so that the different races of animals are, as it were, merely links of a great chain.

Accordingly, we ask what parts form the first foundation of the brain in the embryo, and in the lowest vertebrate animals, or what parts of the brain are to be regarded as primary, and absolutely indispensable, and what only appear later as secondary, but which on that account are endowed with not less important functions?

Let us take into our hand the excellent representations of the embryonal human brain of Tiedemann (*Anatomie und Bildungsgeschichte des Gehirns:* Nürnburg, 1816); we shall observe the spinal cord bend itself under an angle, into the medulla oblongata, and in front of the first foundation of the cerebellum are seen the corpora quadrigemina, and also yet further forwards the optic thalami, which but just now become covered by the indications of the hemispheres. We find, also, the same fundamental form in fishes, only the medulla oblongata and cerebellum are yet very imperfect, the hereupon following corpora quadrigemina are very large, and a prominence lying in front of these, not only gives off the roots of the olfactory nerve, but also covers the corpora striata and thalami, so that it is to be interpreted as the foundation of the hemisphere.

Upon the signification and functions of these different parts we can be in no doubt. In the fish, we see the trigeminal, the acoustic, the vagus, which also corresponds to the glosso-pharyngeal, arise from the medulla oblongata, in a word, the nerves of sensation, hearing, and taste. In the medulla oblongata, and possibly even somewhat further forwards, in case a connection with the thalamus occurs, must accordingly the seat of perception for sensation, hearing and taste be contained; there are in fishes no other parts to which these functions can be referred.

Further forwards we see the optic nerves come off from the corpora quadrigemina. Thus, these must be in the fish the seat of the perception of sight, as no other parts are found which could fulfil this purpose.

Still further forward, at the root of the olfactory nerve, must then the perception of impressions of smell take place.

Now remain still the corpora striata, which stand in so close relation with the pyramids, and the movement-inducing anterior nerve roots; they are organs of motion on which the will acts, and through which we exercise command over the movements of our body.

We herefrom assume that the first foundation of the brain begins with parts through which we are brought into relation with the external world, that is to say, with the sensory apparatus which, at different points of the brain, bring the impressions received from without to perception. Only later does the apparatus appear which insures us the government over our own bodies and voluntary motion. The first-named are, therefore, primary parts, or as it were the groundwork, on which the rest of the structure is brought further and further towards perfection and complexity.

Travelling onwards in the vertebrate kingdom, we see that the primary foundations maintain themselves, with the amphibia, with the birds, with the different mammalia. The nerves arise in the fish as in man, out of the very same parts; the optic, in all of them, proceeds from the anterior corpora quadrigemina, the trigeminal from the medulla oblongata, and so on, and in the lower animals as well as in man, injuries of those corpora quadrigemina are followed by complete blindness. Thus we come to the conclusion that the functions of these primary parts of the brain are identical in the whole animal kingdom. But in the higher animals there appear in addition new and constantly more elaborated parts, namely, the hemispheres, which, in the advancing development of the embryo, as in the higher grades of the animal kingdom, constantly increase further backwards, and cover the parts lying at the base of the brain. In the fishes, the hemispheres are very small, and allow the corpora quadrigemina to lie still quite free; in the amphibia they have already increased in size; in the birds the corpora quadrigemina are displaced laterally by the growth of the hemispheres, while this was not yet found in the embryo of the bird; in the mammalia, the hemispheres begin to bridge over the corpora quadrigemina, and with a greater development posteriorly, they lie on the cerebellum: at length in man, they have increased so as entirely to cover the latter.

We cannot, therefore, place the seat of the sensory perceptions in the hemispheres, and just as little the motor energy of the will; for we have already observed both functions in complete attainment in the fishes, where, however, only the first rudiment of the hemispheres is bestowed. In a certain sense we may therefore distinguish the hemispheres as secondary parts of the brain, which are added to the primary, and stand in relation with the organs for perception and expression of the will, but do not themselves represent those organs.

It is also generally acknowledged that the hemispheres are insensible, and injuries of them are not attended with perception of pain, impressions made on them do not become sensitive perceptions.

If we ask after the signification and the functions of these secondary parts of the brain, those especially of the hemispheres of the great brain, the assumption appears not too bold that the impressions on the deeper-lying primary parts, are here further elaborated and changed to definite ideas. It is also now universally admitted, that the hemispheres of the great brain are the organs of the higher intellectual faculties, and for this, as will be shown further on, pathological anatomy furnishes quite distinct proof.

The different modes of action of the primary percipient parts of the brain and of the hemispheres of the great brain, present themselves very distinctly, when we consider the occurrences in the act of vision.

For example, if I look at an object, its perception follows in the anterior corpora quadrigemina, and that perception, disregarding the peculiarities of the eyes, is the same in the fish and in man. Whilst, if I say that object is a man, or he is a friend whom I recognise, then have we no longer to do with an action of the corpora quadrigemina, but with one belonging to the cerebral hemispheres, to which the impression received through the corpora quadrigemina was transferred for further elaboration. This observing, recognising, judging, is a higher function, which reaches a very different degree in man and in the fish. If now that object vanishes, and the perception in the corpora quadrigemina ceases, I no longer indeed see my friend, but with that the secondary action of the hemispheres is not yet lost; the impression, which here becomes changed into an idea, can be called back, and I can again present to my mind the picture of my friend with all the peculiarities which show themselves in him.

Before I undertake a closer explanation of these modes of action, for which latter, still further evidence shall be adduced, it is especially requisite to prove, that between the deeper-lying primary percipient parts of the brain, and the cerebral hemispheres an anatomical connection really exists. In other words, the way is to be shown (that is, the fibres) through which the primary impressions become conveyed to the hemispheres.

SECTION 3.—*Anatomical connection between the primary parts of the brain at the base, and the hemispheres of the great brain.*

The central nervous system consists of two kinds of substance, of the grey and of the white or medullary substance. In the present day, a detailed proof is scarcely necessary that the true sources or centres of the power of the brain are to be sought in the grey substance and its cells, while on the other hand, the nerve fibres or nerve tubes in general, merely form conductors. It is further acknowledged that all nerves originate in cells of the grey substance, which cells are connected by fibres with one another and with other groups of cells. We might, in a certain sense, therefore, compare these nerve fibres with our telegraph wires, and the groups of ganglion cells with our telegraph offices, where an action is originated, and becomes conducted away through nerve fibres to other parts.*

It is known that in those parts lying at the base of the brain which I have just distinguished as primary, several nuclei of grey matter occur; thus, for example, at the origin of all the nerves of sense in the medulla oblongata, in the corpora quadrigemina and optic thalami; also, the corpora striata, which appear to us to be the centre for voluntary motion, consist of grey substance for the greater part. The cerebral hemispheres are covered by the grey, so called cortical layer. Between these two structures, we find masses of white medullary fibres. One may therefore, *a priori*, suspect, that these white brain fibres represent conductors, by which an effect is conveyed from one part to another, and through which the connection between the various groups of grey substance is established. In an inquiry into the functions of the brain one must, therefore, necessarily take into account the course and direction of these fibres, as also their connection with the grey substance.

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* We must not indeed view the nerve fibres as simple conductors, whose efficacy proceeds entirely from the grey substance, for some spontaneous power also dwells in them. According to some recent researches of Pflüger, a muscle contracts more strongly, when the irritation acts not too near the muscle itself, but runs through a longer nerve-tract. A divided nerve may lose the power of answering to irritation by muscle contraction, but may, by repose, again acquire that power, although it is separated from its origin. Through the researches of Philipeaux and Vulpian it was ascertained even that a divided, and after a certain time, degenerated nerve may, after the lapse of a longer space of time, return to a normal condition, so that, on the occurrence of irritation, it again calls forth muscular contraction, notwithstanding it has not re-united with the trunk (*Comptes Rendus*, Sept. 3, 1860, p. 363). This faculty, in such cases, the nerves do not receive from the ganglion cells. The ganglion cells may, however, act as stimulant to the dormant energy in the nerve tubes, the peculiarity of which energy is indeed still quite unknown to us.

Vieussens, Vicy d'Azyr, Gall, but especially Reil (*Reil's Archiv. Bd.*, 8, 9, 11), have in earlier times accurately examined and described the course of the brain fibres, and more lately Arnold (*Icones cerebri*), Foville (*Anatomie du Système nerveux cerebro-spinal*, 1844), and Gratiolet (*Leuret et Gratiolet, Anatomie comparée du système nerveux:* Paris, 1857), are especially to be mentioned.

According to Foville's researches, we have to distinguish two special fibre systems, which place the parts lying at the base of the brain in connection with the cortical layer. The first system, which was already more or less known to the earlier anatomists, comprises those fibres which leave the anterior surface of the medulla oblongata as the pyramids, pass through the pons and the crura cerebri to the corpora striata, or, more exactly expressed, those fibres which, as carriers or conductors of our will, arise in the corpora striata, and pass backwards through the parts named to the medulla oblongata and anterior columns of the spinal cord. But on the other side, a mass of radiating fibres proceeds from the corpora striata, rises vertically to the convolutions of the brain, to end in its cortical substance. These fibres, spreading out like a fan, extend to the anterior, middle, and posterior lobes of the brain, down to the base, running nearly everywhere parallel to the fissura magna between the two hemispheres, and about two centimetres distant from this fissure. Foville reckons with these his gyri of the fourth order. Through these fan-like fibres, arising from the corpora striata, the centres of our voluntary motion stand in close connection with the grey cortex of the brain.

The second system of fibres which put the centres of perception in connection with the great brain, have an entirely different course. From the posterior surface of the medulla oblongata, the fibres course along the inner side of the thalamus, and in the walls of the third ventricle to the anterior perforated space (*substantia perforata antica*), which is situated in front of the optic tract, here crossing the crus cerebri, and at the side of the chiasma. With this place the root of the olfactory nerve is in direct connection, and the optic communicates with it, through its soft commissure, commissura mollis. From thence, this bundle of fibres runs in an arched direction from before backwards over the corpus callosum, and turns downward behind its posterior border to the lower part of the lobe; it is covered with grey substance, and from it fibres are constantly given off, which are directed towards the upper edge of the great fissure of the brain. This convolution (by Foville called Ourlet), whose fibres run from before to behind, but not fan-like, appears especially destined to connect the centres of perception with the cortical substance. To this second system also probably belongs the layer of fibres described by Gratiolet (*Anat. comparée*, pl. xxvi., fig. 4^{mmmm}) which radiate backwards and upwards, from the tractus opticus, where this turns from behind towards the corpora quadrigemina and the thalamus.

A third system of brain fibres is formed by the commissures by which the two hemispheres of the brain are brought into connection with one another.

From this short survey, it is clear that the centres of voluntary motion and of sensory perception are connected with the great brain by a double system of fibres; the one, fan-like, extends from out of the corpora striata upwards; the other, horse-shoe shaped, from before to behind over the corpus callosum. It will, therefore, be necessary to enter into a closer examination of the elements composing these parts, and to ascertain if by that means the obscurity which envelopes the functions of the brain cannot in some degree be cleared up.

SECTION 4.—*Different kinds of Ganglion-cells in the Brain and Spinal Cord in general.*

When, in late years, the minute structure of the central nervous system began to be subjected to a more accurate microscopical examination, it became quite apparent that the cells which were met with in such numbers in the grey nerve substance, are the most important forms of the nervous system, and that all activity proceeds from them. Thereupon it was also found that these ganglion cells, in different places, are distinguished from one another by size and shape. The cells in the anterior cornua of the spinal cord, from which the motor nerves arise, are distinguished not only by more considerable size, but they also possess a greater number of filaments by which they are connected partly with one another, partly with the nerves arising from them. The cells in the posterior cornua of the spinal cord, which appear to stand in closer relation with sensitive nerves, are in general smaller, more oblong, and have fewer filaments. But even yet smaller cells occur in the spinal cord. Jacubowitsch (*Ueber die feinere Structur des Gehirns und Rückenmarks*: Breslau, 1857) believed, therefore, that three kinds of cells might be distinguished, namely, large motor, small sensitive, smallest sympathetic.

I have elsewhere averred (*Bau und Functionen der Medulla Spinalis und oblongata*, u.s.w., s. 129), that this division cannot be carried out, as the cells out of which the auditorius arises are even larger than those motor cells in the anterior cornua of the spinal cord. In the brain, again, even greater differences occur. In the cerebullum we find very large cells with peculiar shape and ramification, and then, again, very small ones; in the pons Varolii the cells are smaller, in the substantia nigra of the crura cerebri again, larger, and, on the contrary, very small in the corpora striata, but mixed with some larger ones; also, in the cortical substance of the hemispheres, especially in the surface, one meets with layers of the most delicate cells, for the distinct perception of which, even, very strong magnifying power is required.

I might, indeed, have before laid down as a general rule the proposition enunciated in my work above-named (p. 128), that where the nerve fibres or the grey substance are endowed with a peculiar function, specific cells occur, which are distinguished as well by their form and structure as by their connection with other cells.

Through and in these cells begins the peculiar kind of action which is communicated to the nerve fibres. Thus with the centripetal nerves, with the olfactory, the optic, the auditory, the nerves of taste, we find at the peripheral extremities ganglion cells, through which the activity in these nerves becomes excited. Very probably we have with the sensitive nerves the same condition, in the tactile (*Pacinian*) corpuscles, through which may be explained the different sensations produced by a stimulant acting on the skin and the same stimulant affecting immediately the nerve trunk. By the beautiful experiments of E. H. Weber, we know that the skin indeed distinguishes warm and cold objects, but that only a painful sensation occurs when a nerve trunk is excited by warm or cold objects. We may pre-suppose the same relation in the central nervous system. Everywhere, where cells are found, the action proceeds from these, and where the effects are diverse, there will also the structure and composition of the cells be distinguished by peculiarities. Microscopical examination has already thoroughly confirmed this.

Before I further set forth these diversities of the cells, I will first treat of their mode of action, and of the action of the parts in which they occur, so far as we are in a condition to give an account of them. Otherwise the mere enumeration of these diversities would be only a dry catalogue of small peculiarities, in which it would not be easy to discover any regulated connection.

SECTION 5.—*Mode of Action and Connection of the Central and Peripheral Nerve- and Brain-Cells.*

In order to understand the mode of action of the brain cells, we must inquire into the functions of our organs of sense, in which the different cells play so great a part.

However strange it may at first sight appear, we are quite justified in stating that in the strict sense of the words, in seeing, not the light itself, in hearing, not the sound itself, is perceived. A short explanation will make this clear.

As is known, behind the retina of the eye lies the so-called bacillary layer, whose rods are so placed that their axes coincide with the rays penetrating the eye, that is to say, the direction of the rays is in the length of the rods. In an individual rod, a specific action is called forth by the light, and is conveyed by an extremely delicate fibre to a nerve cell (Ecker, *Icones Physiolog.*, tab. xx., fig. 12 *b*, *c*, *g*, *f*, *m*); but this stimulation of the nerve cell brings into activity those fibres of the retina with which it stands in connection. The nerve fibres themselves, that is to say, the retina, is itself as we now very well know insensible to light, and a cone of light directed through a lens to the place of entrance of the opticus where all the fibres of the retina assemble is not perceived. These fibres become excited through the nerve cells which receive the irritation from the rods. The fibres of the retina and of the opticus carry hence the effect to the corpora quadrigemina, where they again terminate in peculiar cells, and here for the first time does perception of light take place. All injuries of the anterior corpora quadrigemina, have, therefore, blindness as a direct consequence.

When, in the dark, we press on the eye, and experience a sensation of light or fire springing forth, there is, of course, no light, but through the mechanical effect the retina is excited, and it communicates that excitement to the centre, where we perceive it as light. Consequently, we perceive not the light itself, but a peculiar kind of operation in the cells of the retina and the corpora quadrigemina. But we must assume that the cells in the corpora quadrigemina stand in close connection with the individual, so that we may properly distinguish them as central cells, or, still better, as perception cells. Their specific function in this case is to set in our knowledge the consciousness of the perception of light.

With hearing the case is similar. In the cochlea the cells of Corti[*] are probably destined to communicate the impressions of sound to the cells of the auditory nerve, and it would appear that the vibrations of sound produce just as little effect on the nerves of hearing as the rays of light on the retina. Otherwise, it would be difficult to explain how we are in a condition to distinguish the different tones of a piece of music if all the tones were conveyed simultaneously through the same nerve fibres. The effect is now delivered to one fibre of the auditory nerve, which fibre probably corresponds to a particular tone, and this fibre leads to the central cells, out of which the auditory nerve arises. The operation of these cells we now perceive as sound, and not, peradventure, as light or as pain; we perceive also the specific action of these cells, and not the air vibrations themselves. Therefore may hallucinations of hearing occur without any real sound being in operation. That those central cells, or perception cells, do not become immediately affected by vibrations of sound is to be concluded from this—that destruction of the internal ear has deafness as a consequence; for vibrations of sound are conveyed by all fluids and solid bodies, consequently, also, through the skull and through the brain, and must therefore reach the perception cells.

We find a similar disposition in the olfactory apparatus. In the upper part of the nostrils lie peculiar epithelial cells, which appear to be connected by a fine fibre, with ganglion cells, in which the fibres of the olfactory nerve end.* Certainly odorous particles do not act directly on the nerve fibres, they would scarcely be able to press so quickly through the relatively thick epithelial cells, they rather, appear to induce a specific action in the epithelial cells, which by means of the ganglion cells, is delivered to the fibres of the olfactory nerve. So soon as these epithelial cells experience an injury in their power, smell is lost. Also, only volatile matters are smelt, not, however, through fluids, although these may be saturated with odorous material; for fluids appear to cause an abnormal action of the epithelial cells by inducing their imbibition and swelling. With copious secretion of mucus in catarrh we lose smelling. Mucus and water, however, can only with difficulty penetrate to the nerve itself; they act much more on the epithelial cells, which appear to have for the olfactory nerve the same signification as the bacillary layer for the retina, or the Cortian cells for the auditory nerve.

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[*] Compare Ecker's *Icones Phys.*, tab. xvi., fig. 2, *f*, *g*, *h*, *k*. The connection of the Cortian cells with the auditory nerve has again lately been denied, and especially the structure of the bird appears to oppose it, where the thicker end of the Cortian cell is turned to the nerve fibre. Here the nerves appear to spread out only in the skin or in the cartilage of the acoustic membrane, just as, also, according to many statements, in the mammals the nerve remains under the lamina perforata.

The nerve of taste appears to end in like manner, although anatomical proof of this has not yet been produced. Thus much appears determined, that the fibres of the glosso-pharyngeus terminate in small nerve cells (Remak in *Müller's Archiv*, 1852, s. 52), and similar ones seem to be present with the finest fibres of the lingualis. The gustatory papillæ, again, seem to be covered with Cortian cells, which end in a long fine fibre, and cohere with the fibres of the gustatory nerve (Fixsen, *De Linguæ raninæ textura:* Dorp, 1857, figs. 4, 5, 6). A connection between the epithelial cells and the nerve fibres, such as occurs between the retina and its bacillary layer, and in the other organs of sense, is therefore at least, very probable. So much is certain, that changes of the epithelial cells in the coated tongue have a decided influence on taste. Nor can we fairly assume that sapid matters penetrate to the nerves themselves, and affect these directly; for, if the latter were so completely exposed to the action of external agents, they might much more quickly sustain injury from salt and strongly irritating substances. Further, we cannot well believe that these substances penetrate so quickly through the mucous membrane and come into contact with the nerve itself; the acids at least would be neutralised by the saliva, and consequently could no longer act on the nerve. In any case we are justified in the assumption, that sapid substances are not directly perceived, that through them only a peculiar effect is produced on the nerves of taste, which effect is carried to the central cells in the brain, and here becomes perceived, that is to say, in other words, the action of these central cells is perceived as taste. But it is not certain whether different kinds of cells exist here, which, on the occurrence of irritation, excite the sensation of sour, of sweet, or of bitter.

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* The immediate connection of these parts (Ecker, *Icones phys.*, tab. xviii., figs. 2, 3, 5,) is indeed not yet quite proved, but still is highly probable. The representation in the dissertation of Erichsen (*De textura vera Olfactorii ejusque ramorum:* Dorp, 1857) which illustrates the connection between the nerve fibres and epithelial cells, might well awaken distrust; and the correctness of the observation has been also doubted by others.

Lastly, the same condition appears to obtain with regard to the cutaneous sensibility. Certainly, the mode of ending of the sensitive nerves is not perfectly known; they appear to end in the tactile corpuscles, in which also cells filled with granular matter occur, and which thus correspond to nerve cells. It is true that these tactile corpuscles, first described by Wagner and Meissner, are known almost only in the fingers and toes, and the mode of termination of the remaining sensitive nerves is not yet discovered. The transmission of impressions on the skin follows in a complicated manner. The sensitive nerves appear to end in peculiar ganglion cells in the spinal cord, from which fibres course to the other side, and hence rise to the base of the brain, where at or near the thalamus nervi optici the peculiar perception follows.*

In this respect the already-related experiment of E. H. Weber is significant, as showing that we can take cognizance of different degrees of temperature by means of the skin, but not by placing a warm or cold body in contact with a nerve-trunk. In the latter case we merely experience a feeling of pain. We may from this draw the conclusion that in the skin, and very probably by means of the nerve cells which everywhere manifest themselves as exciters of nervous action, a specific stimulation and mode of action in the sensitive nerve fibres occurs, but this stimulation becomes perceived in the centre of the nervous system as cold or as warmth. Thus it happens that the nerves of sense always answer through their special sensibilities, when the same stimulant—*e.g.*, the electric or galvanic—acts upon them; galvanic irritation produces appearance of light in the eye, sensations of sound in the ear, perception of taste in the tongue, pain or a feeling of warmth in the skin. The stimulant in operation is one and the same, but on the other hand the effect on the central cells is different, and brings us the perceptions corresponding to the different organs of sense. Thus it is that section of the opticus is not attended with pain, but merely with a sensation of light.

It follows, from the preceding, that in reality we do not perceive the natural phenomena themselves by which we are surrounded (*die uns umgebende Natur selbst*), but only the peculiar effects of the brain cells which are called forth by impressions from without. What does not here (*i.e.*, in the brain cells) call forth an effect, is not perceived by us. Thus may yet many things be existing in Nature of which we have no knowledge. These cells, which from their mode of action we may designate perception cells, stand in close relation with our individuality or our mind, that is to say, in their active powers they communicate immediately with our mind. They lie, however, altogether in parts which are to be found at the base of the brain, which first arise in the embryo, and which in the fishes constitute nearly the entire brain.

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* If we suppose the anterior cornua of the spinal cord, which are connected with the motor nerves, and the posterior cornua, in which the sensitive fibres end, to be prolonged upwards into the brain, then the anterior cornua will be represented by the corpora striata, of whose motor relations there is no doubt, and the posterior cornua by the thalami, which probably serve for perception of feeling. Türck also maintains that with loss of perception of feeling, an injury of the thalami always becomes apparent. An observation of Waters (*Brit. Med. Jour.*, 4th May, 1861; Schmidt's *Jahrbücher*, 1861, No. 9, s. 294), entirely corresponds with this. A man who had long suffered from weakness of the left arm became hemiplegic: the speech and power of thought were not impaired, the tongue was drawn somewhat to the left and the mouth towards the right, the right eye could not be completely opened, the sense of touch appeared no way affected. On section, the right corpus striatum was found quite softened, the corresponding thalamus entirely normal. Waters concludes from this that the corpus striatum stands in relation to motion.

These cells are very much distinguished by size, configuration, and richness of connecting fibres, from those cells which occur in the spinal cord, from which the motor nerves arise, just as also sensitive and reflex nerves end therein, and of the action of which cells we obtain no direct perception.*

SECTION 6.—*Cells of the Cortical Substance.*

Clinical researches, vivisections, and comparative anatomy, lead to the now generally well-acknowledged assumption that the cortical layer of the great cerebral hemispheres stands in close relation with the intellectual powers. On microscopical examination of this cortical layer, for example, in vertical sections, we see that the fibres of the medullary substance penetrate into it in a fan-like manner, unite again into bundles, become crossed by transverse fibres, and that numerous ganglion cells lie between these bundles. These cells vary in magnitude, although they are all very small, they have several minute filaments (*Ausläufer*), generally three or four.†

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* Pflüger's view, which Lewis in his new Physiology has brought into so great currency, I will not more particularly detail. An unconscious sensation (*Empfindung)*, which Lewis will yet distinguish from perception, is, in my opinion, a nonentity. The researches on the sensory function of the spinal cord by A. Mayer, of Mainz (*Prager Vierteljahrsschrift*, 1861, 1 Bd., s. 44, bis 45; Schmidt's *Jahrbücher*, 1861, Bd. 111, s. 278), are of especial interest in reference to this point. According to Mayer, Pflüger has been so far in error, since the medulla oblongata in the frog extends much lower downwards, that is to say, as far as the shoulder blades, and consequently on decapitation of the frog, it still remains in connection with the spinal cord. But in it are rooted sensation and motion, as may be observed in the development history of animals and in the brain of the fish. Those appearances which prove the existence of sensation and voluntary motion cease in the frog as soon as the medulla oblongata is also taken away. Therein lies a fresh proof that the seat of voluntary motion is to be sought in the corpora striata, and at the end of the medulla oblongata. If the true spinal marrow alone is in existence, voluntary motion is absent, and merely reflex movements are still observed; the animals no longer accomplish co-ordinate movements, and they betray no sensibility. The arguments which have been adduced from the movements of the tail in eels, salamanders, and even young cats, are not convincing. The movements of the cat's tail vary according to the different situations of the irritated point. Thus Schiff found that on irritating the tip, the tail always turned away from the irritant; on the other hand, on irritation of the root, it approached the flame.

† The course of the fibres as portrayed by Berlin (*Beitrag zur Structur-lehre der Grosshirnwindungen Erlangen*, 1858), I find quite correct; on the other hand I find there the ganglion cells too large, and also too few; for they exist in countless multitude.

Near it also very fine cells occur, which are mostly situated on an extremely fine fibre (*Fädchen*), and through it are connected with a nerve fibre or with a larger cell.

SECTION 7.—*Action of the Cells in the Cortical Substance.*

In the cortical substance different kinds of cells lie above one another in several rows, in which the vertically penetrating medullary fibres appear to end, and, moreover, these cells appear also to be connected with one another by means of fibres.

The difference in magnitude and configuration of these cells justifies the assumption that they have also different functions.

But we have seen that, next to these primary parts at the base of the brain, in the ascending scale of animals, as also in the embryo, more of the great brain becomes developed, grows backwards, and covers those primary parts. In the same ratio with this increase of the great brain, the mental powers also increase. It has thus been proved that the cortical layer of the cerebrum is closely connected, through peculiar brain fibres, with the primary parts at the base, or with the organs of perception and of the will. To become acquainted with the condition and the mode of action of these cells of the grey substance, is therefore an important but also a difficult problem.

Proper sensitive impressions are conveyed to the perception cells lying in the primary parts of the brain, which cells are connected by peculiar fibres with the cortex of the brain. Herein also may those influences become further extended, and here may they be elaborated (*verarbeitet*), somewhat in the following manner.

When we go to bed and, for example, lie on one side, a multitude of confused images hovers before our mind. If we are at all excited by preceding lively company, or by any other cause, then these images become so vivid that they prevent sleep. Involuntarily we turn on the other side, and the images vanish, but soon become replaced by others. After some time we lie again on the other side, in order to be freed from the troublesome images; this is yet again several times repeated, until at last we sleep. This sequence of events permits of the following explanation. As the blood exercises an exciting influence on the whole nervous system, so does it especially on the cortical substance which is unusually rich in capillaries. The vessels of the brain have, as is known, thinner walls, as the muscular layer is almost entirely absent in them, on which account also they can exert only a weak pressure on the blood. The blood following the laws of gravity will accumulate in the deeper-lying parts of the grey substance, and in consequence of the greater congestion and more copious transudation will act more powerfully on the cells, whose natural function is therefore stimulated to activity. But these cells do not at all excite the idea of light, or sound, or pain; rather will the impressions received through the organs of sense conveyed to them (*i.e.*, the cells of the grey substance) be united into images and representations, and be reproduced by renewed irritation. Therefore, if, in the circumstances specified, we turn to the other side that involuntary activity ceases, but the blood sinks again into the opposite hemisphere and the game begins here anew.

In this way are explained the involuntary occurrence and the irregularity of these images and representations; and not alone in the night-time, but also by day, when we are engaged in conversation, such involuntary images may pass through our minds. We find a very good sketch of them in Gaubius' excellent treatise, "*De regimine mentis quod medicorum est,*" where it is said: *Quam incommodum sæpe est rem aliquam cogitanti, sopitis etiam sensibis externis, tot tamque alienas ex corpore suggeri imagines; quam difficile cum prosiliunt, reprimere, cavere ne continue interveniant.**

But, we may ask, does not this theory lead to the grossest materialism, and will not our mind through it be degraded to the level of a mere cell life? By no means. By that interpretation, during which I have, as much as possible, truly followed the course of nature, the independence of the individuality of the mind remains, according to my opinion, in the clearest way secured. For during the time in which those confused and intricate images pass before our mind, we may at will, firmly retain one of them so as further to embellish it quite according to our liking. That proves, then, that a still higher faculty is active in us, which can receive and perceive those impressions, but is also at the same time in a state independently to interfere and to govern the orderless mass. We have a telegraph office, but at the same time also a telegraphist who voluntarily and independently exerts influence. The involuntary delineation of those images is an organic operation of the brain: we feel that the images are presented to us, that they are not our own individuality, and that they exist as objects outside of us. Our will, on the contrary, belongs to our individuality, it is not product of the body but of the mind, it is subject. The materialist will compare us to a telegraph office without a telegraphist, to an automaton, who only blindly acts, without order, without will, without understanding and judgment, to an uninterrupted dreamer who cannot perceive his own dream. Free will belongs to the higher individuality, it is an attribute of the soul.

With these involuntary images, correspond also those which occur as signs of cerebral irritation in our confused dreams. The state of bodily health is, therefore, of most decided influence on the dreams. After a heavy supper, through which increased congestion of the brain occurs, we generally dream, doubtless in consequence of irritation of the cells in the cortical layer, in which earlier impressions and representations become again awakened, and now by an impulse which proceeds from the body and not from the mind. The connection of these cells with one another appears to be for the purpose of combining the impressions received through the organs of sense, in order to transform them to ideas and images for the mind, so that inversely, the mind can again call back those impressions. These cells are the physical elements of the faculty of recollection, and with injury of the brain cortex in imbecility or in great age the memory is quickly lost, that is in these cells the earlier impressions can no longer be reproduced with similar facility.

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* The question may indeed be started, whether the involuntary and confused images which play about us, are really productions of the brain cortex, or whether they may not perhaps originate in the retina, and be conveyed to us from this. The following easily repeated experiment, which I have often employed, contradicts this assumption. If, in the dark, one has such an image before oneself, let the eyes be moved to the right or to the left, and one becomes convinced thereby that the image does not follow the motions of the eyes, but remains immovably fixed in front. If one then observes accurately the spot which the image in question occupies, and places a finger upon it, one becomes satisfied that this spot is above the eyes in front of the forehead, that is in the region of the *lobi anteriores cerebri.*

If an unusual impression befalls the brain cortex, if it is strongly irritated through accelerated circulation, through the more or less pathologically altered blood in nervous fever, then those ideas and images attain such strength, that we are no longer able to distinguish them from those brought about by the organs of sense, or more strictly by the perception cells, delirium arises. Or after the copious taking of spirits, the images pass more quickly and under stronger impressions on our mind, so that we can no longer accurately follow them; the thoughts are no longer under our control, and we rave.

I observed a very instructive case in reference to the significance of the cells of the brain cortex in a tradesman who came, conducted by his son, to me, to obtain my advice on his condition. The son informed me that about half a year back, his father had an apoplectic attack, of only short duration, and which left behind it no paralysis; yet the memory, for names or words, had in a great measure, vanished, so that he called objects by wrong names, and, for example, used the word chair (*Stoel*) when he meant a table (*Tafel*). Yet he well knew that the word "chair" was not the correct one, and he brought forward other words until at last he came to "table," which word he then pronounced with great satisfaction for having found out the right name. The fault in this case lay not in the corpora striata, but in the cortical layer, for there were no paralytic symptoms either in the limbs or the tongue.

Something similar has repeatedly occurred to me. But with this patient, there was yet another remarkable suppression, such as I had not before observed. As the son informed me, his father was no longer able to read, although the sight was not impaired. I placed a large printed book before the man; he distinguished the letters in it quite well, and spelt, for example, the word towards (*a*, *a*, *n*), but he was not able to combine these letters into a word.

Thus, the perception of the letters through the cells of the corpora quadrigemina followed undiminished, but the capability of elaborating these signs was lost, of combining them into an idea, into a word. This process appears to occur purely in the brain cortex.

The man had also lost the capability of writing, so that he could no longer sign his name. No trace of paralysis could be observed in his fingers, nevertheless, he made figures on paper which resembled inverted letters, or were entirely unrecognisable. Consequently, he had not only lost the capability of combining signs or letters, but he was also deprived of the distinct idea or recollection of these signs, and upon that depended his inability to write. For when these ideas in the cortical layer failed, the man could no longer act in such a manner through his will on the corpora striata and so govern his movements that the letters or words should be properly formed on paper. In this case, the connection, through the communicating fibres, of the cortical layer and the corpora striata, the organ of voluntary motion, becomes apparent.

So in the fancy of the painter a distinct idea of his painting is present. This idea arises not in the corpora striata, but in the cortical layer, where the impressions appear to combine into an image whither at least are transmitted, the impressions which his will can reproduce and also bring on the paper.

But the most remarkable circumstance with my tradesman was, that he could still, according to the assurance of his son, keep his ledger and reckon now as ever; unfortunately I forgot to satisfy myself on this point by some tests. This, however, is to be remembered, that there exist so called prominent talents, for example distinguished calculators who understand very little of other things. But more definitely does it lead to the belief that different parts of the cortical layer are also endowed with different functions, in support of which view further evidence shall afterwards be adduced.

Quite similar observations are found in an interesting treatise by Dr. Marcé (*Mémoire sur quelques observations de physiologie pathologique, tendant à demontrer l'existence d'un principe co-ordinateur de l'écriture et des ses rapports avec le principe co-ordinateur de la parole. Extrait de la Gaz. Méd. de Paris*, 1856). Marcé gives there twelve cases which he had partly himself observed, partly collected.

A man had lost his speech but could still write. When required to repeat the pronounced word *tambour*, he said *fromage*, but he wrote the word quite correctly. He transcribed the words *feuille médicale* accurately, but when required to pronounce them, he said *féquicale, fénicale, fédicale.*

In three of the collected cases the capability of writing was also lost. In one of these three cases the memory of words failed. A pocket-handkerchief was given to him; he did not know the name of it, and wrote down that he had forgotten the word. The word pocket-handkerchief he transcribed correctly;

he also produced a pocket-handkerchief when the name became known, and he could likewise write it; but after a few minutes he had again forgotten the name, and he could also no longer write it.

The eleventh observation agrees with mine in this—that the patient distinguished the single letters quite well, but was no longer able to combine them into a word. He transcribed a word quite correctly, but could not write it when it was dictated to him. This patient, also, like my tradesman, could write figures very well.

The patient of the seventh observation was restored. When he could not yet write down his name from memory, not only did he write figures, but he also solved complicated arithmetical exercises, and set the figures always in their proper places. Only later did he begin to write words.

In the sixth and eighth observations, also, the patients could not write letters, and only made unrecognizable characters on paper.

The different intellectual faculties are thus not always simultaneously lost: with some patients the combining of words fails; others cannot form letters by the memory; and at the same time some of them retain perfectly the recollection of figures. Intelligent thought was unimpaired in all. We must, therefore, with Marcé, assume that these intellectual powers do not come into activity in the same parts of the brain. In that way is explained why many persons, for example, I myself, have a much better memory for numbers than for names.

We may thus regard the cells in the cortical layer as the apparatus for memory and for imagination. It quite corresponds therewith, that in brain diseases, especially when the cortical layer suffers, memory is so readily lost; and also in advanced old age, when the cells are no longer so excitable, and partly atrophy, or at any rate undergo some change. For at least in the medulla spinalis and medulla oblongata the cells are more deeply coloured and richer in pigment in old age. If they no longer answer to the influence present, and no longer provide us with the required idea of a figure, then recollection fails us.

A remarkable observation of the kind was made by me in a man who had lost his recollection for most words and things, through concussion of the brain, resulting from a fall. He came into the Utrecht Institution, and could mention neither his name nor his age, nor the place of his birth; also, in speaking, he could frequently not find the words. When a cat came into his sight, he was much surprised at the extraordinary animal, the like of which he had never before seen, and he began to draw the cat with a stick on the sand. Soon afterwards he met with a chestnut tree in blossom; the beauty of the flowers, which he persisted in not having seen before, he found so remarkable that he climbed the tree, plucked a bunch of flowers, and began to delineate this with a lead pencil. He was surprised that he succeeded so well, for he thought that he had never learnt to draw, and therefore believed that all men were born artists. He now wished to make all the patients with whom he came into contact draw, as, according to his opinion, they must be able to do this equally well. As his pupils were partly unwilling and indocile, he took great pains to convince them that, if they only wished, they could draw just as well as he. After some time his recollection began to improve, and many remembrances of his earlier life returned to him. He related, for the most part, at my visits, his dreams of the preceding night, and he recognised in the morning, parts of his earlier life-history in these dreams. He knew the names of many of the villages of Friesland, of which province he was a native, among them also the name of his native village. It is true he did not yet recognise in it his early dwelling-place, but the name made an especial impression on him; it was for him a very pretty and remarkable name, without his knowing wherefore. The next night the picture of his village returned to him in a dream, and now he related that he had dwelt in this village. It seemed to him "as if something were removed from his brain," and he was again in a position to imagine new things. This was particularly repeated in his dreams, with several things, and it seemed as if, through increased congestion during sleep, and through better nutrition, the cells were returning to their activity. In a few weeks he had entirely recovered, without a trace of brain affection or of failure of memory remaining behind, and he stayed yet some time longer in the institution, as an attendant. Thus we see that, in this case, the efficacy of those organs in which ideas and images are reproduced was impaired through the concussion of the brain; with their recovery the memory returned.

Impairment of the activity of these cells moreover, seems to occur easily. Even in quiet dreamless sleep this appears to be the case, and the cessation of their action, and of all ideas, seems to stand in close connection with the absence of consciousness.

We may distinguish these cells through which images are reproduced as imagination cells (*Vorstellungszellen*). Examples are not wanting to show that, strange to say, their operation may be impaired to a greater or less degree. A young lady, through the running away of a horse, sustained a severe injury by her head being struck against a tree, and became unconscious. She recovered herself, but retained for three weeks a childish manner; she recognised me, however, quite well, and remembered perfectly my visit of the previous day. One morning she awoke as out of a dream, and was quite herself again, only she had forgotten everything which had occurred to her since being struck against the tree. She knew that she had sat in the carriage, that the horse had run away, that she had been struck on the head, while the three succeeding weeks were quite obliterated from her life.

Still more remarkable are the cases where a periodical remission or disappearance of the memory seems to occur. Several years ago I was consulted in the case of a girl, twenty years of age, who, seven years previously, had recovered from a tedious illness, out of which at last, the now four-years-existing condition had arisen. In the morning after she awoke, at a certain hour, a kind of chorea appeared, in which she beat with the hands according to measure to the right and left, that continued a half-hour; then she came to herself, but behaved quite like a child. The next day the convulsions occurred again. But, after they had ended, she behaved herself quite as a discreet maiden; she spoke French and German well, and showed herself well read. Then, also, she knew nothing of the preceding day, but her memory corresponded only with the day but one before, or with the so-called lucid day. This went so far that, on the silly or childish day, she began to learn French again, but had only made moderate progress, while on the following day she spoke it quite fluently. I had visited her fourteen days, invariably on the so-called childish days, when she always recognised me. Then, for the first time, I came to her on a good day, and was quite a stranger to her; she could not remember ever to have seen me. This change had already occurred uninterruptedly for four years, and with such regularity that one might have set the clock by it; for the blows or strokes always returned at the same time, and were repeated in the same number. She was once affected with a tertian fever, the paroxysms of which exerted no influence on the disease. In expectation of a favourable reaction, the fever was not immediately stopped, it was postponed and fell on the bad day. The girl then knew not what was the matter with her, and conducted herself as if she had never heard of the fever. During the summer she generally went with her parents to a country house, and the bad day was chosen for the journey; when she awoke on the next day she was much astonished at the change of residence, and knew not how she had come to the present dwelling-place.

In the *Treatise on Obscure Diseases of the Brain*, by Forbes Winslow (*Edinb. Review*, 1860), a similar case is communicated, only that here a four-weekly period occurred.

These cases sufficiently prove that the memory is linked to the organisation, and participates in its diseases. Only we cannot yet specify what changes in the cells of the cortical substance must take place when definite manifestations shall appear.

In the above related cases of failure of memory, the higher mental faculties have sustained no disturbance, and the faculty of judgment is not weakened, only the judgment often rests upon false premisses. If the premisses are conceded, then is the conclusion perfectly correct, and we ourselves could conclude no differently, if we agreed with those premisses.

The higher intellectual faculties are thus not connected with these cells and their action, they are utterances of the mind itself, and thereon is the logical order and regularity made conditional, in opposition to the confused ideas arising in organic disturbances.

It is remarkable that all the organs of sense do not stand in the same close connection with the higher mental faculties. The most important sense we have undoubtedly in the organ of vision, through which presentations of colour and form are conveyed to us; the impressions retained become also for the most part reproduced, and we speak of *pictures of thought.* The nerve of sight also stands in anatomical connection with the whole hemispheres; in front through the commissura mollis, laterally through the tractus opticus, turning round the crus cerebri, behind through the radiating fibres discovered by Gratiolet; but the fibres of the anterior corpora quadrigemina, radiate along the thalami to the lamina perforata antica, and spread from here through *Foville's Ourlet* further into the great hemispheres. So multiplied a connection of the nerve with the great brain is not found with any other organ of sense. Accordingly, we do not speak of *sounds of thought*, or of *tastes of thought*, but only of ideas and *pictures of thought.* It is true that the nerve of hearing also stands in close connection with the great brain, and especially indeed with the upper and hinder parts of the hemispheres. On that account the nerve of hearing acts more on the feeling and disposition which these parts of the brain, as I shall later detail, especially subserve, whilst sight stands in close connection with the understanding.

As the ideas of sight, so are also the ideas of hearing, reproduced in the cortical layer. The composer writes his piece of music for the full orchestra without taking an instrument to help him, and in his imagination he hears the whole concert in such a manner that he is in a position to perceive the euphony and the harmony of the whole, and to combine in the most reguiar and best way, the tones of the different instruments. As is known, the great Beethoven, on account of deafness, could not hear his own compositions. Once, when after the completion of a composition, a friend to whom he wished to display his new and to himself, pleasing work, visited him, he sat down to the pianoforte and played; but the friend heard only confused tones, because the deaf Beethoven did not know that besides the instrument being thoroughly out of tune, many of its strings were also broken, so that only discordant sounds could be produced.

Pathological alterations and irritations of those cells in the brain cortex which are in connection with the nerve of hearing, have the sometimes occurring hallucinations of hearing as a consequence.

For the rest we are yet very far from knowing the places in the brain cortex where the representation- or recollection-cells of every individual organ of sense are situated.

SECTION 8.—*Different Faculties in different parts of the Hemispheres.*

That to all parts of the cerebral convolutions are not assigned exactly similar functions, was long ago suspected. Further, that a finely arched forehead, as a rule, indicates high intellectual endowment, was already not unknown to the Greeks, as we may conclude from their delineations of a Jupiter, Apollo, and so forth. The strongly prominent forehead as the prerogative of man, came yet more definitely into view when Camper proposed the facial angle named after him, and pointed out its difference in Azteks, Negroes, and Europeans, likewise in children and in grown-up persons.

Gall certainly acted very arbitrarily in the localisation of his organs, yet, at least, he placed the most important organs of the higher mental faculties behind the forehead. Carus (*Grundzüge einer Cranioscopie*: Stuttgart, 1841. *Ueber wissenschaftliche Cranioscopie* in *Müller's Archiv*, 1843, s. 149) distinguished three divisions of the brain which correspond to the three cranial vertebræ, and which should be found repeated in all vertebrata. The anterior portion, or the hemispheres, which essentially lie under the frontal bone, is for him the real seat of the understanding, namely, of idea, of perception, and of the faculty of imagination: the middle portion under the parietal bones, to which also the corpora quadrigemina belong, is the especial seat of feeling and disposition; to the posterior portion, corresponding with the posterior cranial vertebra, are volition, the faculty of desiring, reproduction of the species, attached. Certainly, I cannot entirely agree with Carus; his statements regarding the two first portions have, however, been supported more recently by many confirmations, and my own observations, to be communicated further on, stand also in accordance therewith. Carus asserts that the anterior portion of the brain, the *regio intellectus*, is better developed, as well in animals as in man, in proportion as the intellectual powers are prominent; he found that the forehead in many learned and distinguished men, as Kant, Ehrenberg, Purkinje, Retzius, Raumer, Thorwaldsen, Schiller, Göthe, was both higher and broader. He further contended that in women the middle section of the skull is relatively more developed than the anterior, whilst in men the proportion is reversed; in that he relies upon Hamilton, who found the anterior section of the male brain larger, and appeals also to the slight development of the forehead in Negroes and uncultivated nations.

We have to thank Huschke for more accurate measurements of the sexual differences of the superficies of the hemispheres (*Schädel, Hirn, und Seele Jena*, 1854). In normal brains, he obtained for the distance of the upper end of the central fissure from the anterior and from the posterior end of the brain—

In women, 59 and 130 millimetres	31·3	:	68·7
In men, 88 and 113 millimetres	43·9	:	56·1

He found, moreover, when the brain was cut through vertically in front of the corpus callosum that the anterior section in men, the posterior in women was relatively more developed. The superficies of the male frontal bone reached (the mean of 32 skulls) 15,000 square millimetres, that of the female frontal bone only 13,000 square millimetres. But as besides, the female skull is absolutely smaller, he also compared the area of the frontal bone with that of the rest of the vault of the skull, so far as the hemispheres are covered by it, and these two values rank thus: the mean of 14 female skulls = 26·5 : 73·5 per cent.; the mean of 16 male skulls = 28·3 : 74·7 per cent. Further, according to Huschke's measurements, in the higher races of men a more decided difference in the skull capacity of the male and female sex occurs than in the lower races; this difference is in a great degree more remarkable in the European than in the negro. Similarly also the German race shows a high development of the frontal bone relatively to the rest of the skull vault, in comparison with the lower races whose intellectual development is less. Huschke's measurements have also brought out this remarkable result, that the skull bones, up to the fourth year have doubled in size, but that subsequently, the frontal bone increases, and in the adult is sometimes trebled in size.

Retzius (*Beurtheilung der Phrenologie vom Standpunkte der Anatomie* in *Müller's Archiv,* 1848, s. 243) comparing the development of the human brain with the development of this organ in the animal kingdom, found that in the embryo the posterior lobe of the brain becomes latest developed, and belongs in reality to man alone, and from that he concluded that the anterior lobes of the brain must be considered the lowest, the posterior the highest. But meanwhile, if we are to conclude on other grounds that the upper and hinder part of the hemispheres is more especially destined for the feeling and disposition —wherein, after all, man, in comparison with animals, stands still higher than in his intellectual development—that circumstance by no means contradicts our assumption, that the anterior section of the hemispheres, lying under the frontal bone, is more especially destined for intellectual life, and that the upper and hinder part of the hemispheres is rather devoted to sentimental life.

My respected friend, R. Wagner (*Göttingen gelehrte Anz.*, 1860; Februar und Mai, und *Ueber die typischen Verschiedenheiten der Windungen der Hemisphären und über die Lehre vom Hirngewicht, u. s. w.*, Göttingen, 1860), has presented us with tables of the weight of the brain of persons of different degrees of intelligence, and of both sexes. Celebrated men occupy the first place in the maximum of weight of brain; yet a youth of fifteen stands very high above several learned men, and even women reach above the latter. Wagner, therefore, concludes from those weighings that the mean weight of the brain does not differ in very intelligent and in less intelligent individuals.

With this result of Wagner's I can quite agree, only it appears to me that the measure of comparison laid down is not a correct one. In these weighings the different causes of death ought to be taken into consideration. In a patient who has died of typhus, in consequence of the congestion, there is surely much transudation in the brain, whereby its weight is raised. Further, as Huschke has pointed out, in men the anterior lobes, in women the posterior lobes, are the larger, so that notwithstanding the difference in particular parts of the brain, the total weight may be similar in two individuals, or the female brain may even be the heavier. Wagner would have attained better results if he had followed further in the road struck out by Huschke.

That the anterior cerebral lobes of learned men were most rich in convolutions, stands in accordance with my observations and with my views. It is remarkable, that in the brains of two very intelligent individuals, Wagner found very few convolutions. Unfortunately, it is not at the same time mentioned, whether their anterior lobes were not perhaps more developed.

A comparison of the weight of the great brain with the cerebellum, whose function is yet rather obscure, was undertaken by Wagner and others. No particular result was established, except this, that in women the great brain is relatively heavier in proportion to the smaller.

At present, most writers agree in the view, that it must be assumed that the anterior portion of the great brain is the seat of the higher intellectual faculties. The evidences for this view are so numerous, that I regard it as one of the most certain in cerebral physiology.

It is a recognised circumstance, which we see confirmed in idiots, that weakness of intellect is often associated with a low forehead. We meet, indeed, with cretins and idiots with large heads; but for the most part, collections of water are then the cause. In sound intellectual activity, forms of the skull where the forehead is strongly inclined backwards, so that the anterior cerebral lobes can only be small, are excluded.*

The forms of the brain in animals also supply confirmation. Thus may be mentioned the great development of the anterior cerebral lobes in the orang-utang, which in this respect stands next to man, and also displays the greatest intellectual development among animals.

It was permitted to me to examine the brain of a celebrated mathematician and natural philosopher, who was distinguished for remarkable intelligence and acuteness, and I was astonished at the number of convolutions in this brain, but which individually were not large. The same kind of conformation I afterwards saw with R. Wagner at Göttingen in the brain of the celebrated Gauss, and I have also found the like in the brains of other distinguished learned men.

Quite the reverse I find in the brain of an idiot in my collection. All the convolutions of the anterior lobes of the brain even to the anterior central convolution are only slightly developed and are present in small number, whilst the gyri lying behind that central convolution are large and otherwise normal.

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* Obviously the artificially-produced forms of the skull of the so-called Flatheads in America cannot be considered a defect, but merely a dislocation; they cannot, therefore, be brought forward as counter evidence.

But I find the most convincing proof in pathological conditions. As the result of my many years' continued and accurate examinations, of which further on I shall adduce several, I can state that in proper intellectual insanity (*bei eigentlicher Verstandesverwirrung*), invariably the cortical layer under the frontal bone appeared more deeply coloured, was more firmly adherent to the pia mater, or was softened. On the other hand, in melancholy, where anxious agitation and sensation of heat and pressure occur, and where the emotion more than the intellect suffers, pathological changes are found rather in the convolutions of the upper and hinder lobes.

Thus we come to the conclusion that the cells in the cortical layer of the upper and hinder lobe have a different action from those of the anterior lobe; the former bring about emotional feelings. Whether there may be different classes or divisions of these cells, it is not possible to decide at present.

If we compare the representations of the cortical layer of the anterior and upper part of the brain by Berlin, (*Beiträge zur Structur-lehre der Grosshirnwindungen,* 1858) and Stephany (*Beiträge zur Histologie der Hirnrinde*), with the structure of the cornu ammonis in which, according to Kupffer (*De Cornu Ammonis textura:* Dorpati, 1860), we must suppose only one convolution of the lower lobe of the brain, we perceive such a difference in the disposition of the cortical substance, that from this alone we must conclude the existence of a different activity. Pathological observations also supply corroborative evidence for this view.

In animals also, as I have found in the dog and rabbit, a different texture of the grey substance in the anterior and posterior lobes of the brain is seen. In the rabbit's anterior lobe are seen bundles of fibres, with cells lying between them, which are mostly tripolar; in the hinder lobe, where the roots of the olfactory nerve turn in, a texture is noticed which corresponds with that of the human cornu ammonis, namely, a regular row of stalked cells, which, like organ pipes, stand close to one another. In the anterior lobe the cells measure 0.166 to 0.168 mm., but the nuclei 0.102 mm.; in the hinder lobe there are single larger cells of 0.216 mm., with nuclei from 0.140 to 0.152 mm., but the stalked cells are smaller and have a diameter of only 0.126 to 0.140 mm.

SECTION 9.—*Vivisections.*

The results of my examinations laid down in the former paragraphs are confirmed by vivisections. I will not enter into a detailed statement of what different authors have concluded from their vivisections, but will rather limit myself to that which Schiff (*Lehrbuch der Physiologie,* 1 Theil.) communicates as results of his investigations, although I cannot agree in all his conclusions. According to the unanimous testimony of authors, animals, after removal of the great brain, fall into a lethargic, or rather passive, condition. They still perceive impressions, but the proper active perfecting or elaboration of the same is wanting. The pupil contracts under the influence of light; in a bright light animals also close their eyes; in some cases even a movement of the head followed the to-and-fro movements of a flame. Even the taste is not entirely abolished, for if a solution of colocynth is applied to the tongue, the animals move the latter, distort the lips, open and shut the beak. With regard to smelling, nothing can be discovered, but the nasal mucous membrane is still sensitive to vapour of ammonia. Concerning the hearing, sudden detonations have no influence on the animals, and just as little the cry of birds of prey by which they were before so much terrified, and even a laying down and erecting of the ears no longer occurs. According to Schiff, that originates in the circumstance that all reflex movements (*Reflexe*) called forth by the sense of hearing become defined more or less by other ideas through a so-called judgment. Schiff believes, however, that the animals still hear, because the operation does not at all injure the nerve of hearing, and the animals still see, although the optic nerve is far more easily damaged in the operation. Many things speak in a decisive manner for the presence of sensibility in the skin. Thus birds cleanse their feathers if they are annoyed with vermin. But we miss, however, the external signs of great uneasiness and painful sensations so soon as we are not mislead by the cries of the animals and the reflex movements. The impressions are passively received, without inducing permanent ideas or recollections, and without influencing either the reflection or the judgment.

From all this, it is sufficiently evident that the proper seat of perception is not to be sought in the hemispheres of the great brain, but in parts at the base of the brain, where the nerve centres are contained.

On the excision of the hemispheres of the great brain, Schiff also communicates the following:—A marmot and a cat try to escape when one has put colocynth on their tongues, and they resist if one tries to repeat the experiment. After cutting out the hemispheres, however, they no longer attempt to escape, and they offer no very great resistance to a repetition of the experiment. Schiff explains this by the prevented reflex movements. The proper ground, however, of this different conduct is to be found simply in this, that the animals are deprived of recollection. We see, therefore, that impressions on the proper perception cells, that is, on the centres of the sensory nerves, are not permanent, else a confusion of the impressions following one another, or a blending of them must occur. These impressions do not last beyond the excitement which reaches the perception cells from the organ of sense. In those cells of the great brain, on the contrary, where the impressions become combined into ideas and images, the impressions are persistent, and can also be easily again called forth, that is so to say, these cells are the material basis of the memory.

The animals deprived of their great hemispheres also still see, as we may assume from their movements in stronger illumination; nevertheless, like blind animals they strike repeatedly against mechanical impediments without being able to evade them. Forgetting the impression, they are no longer in a condition to modify their bodily movements according to definite ideas; the capability of recognising the impediment, and the necessary combination to avoid it, is, with the faculty of ideation, taken away from them. They are passively susceptible without re-acting, they no longer understand or comprehend. Thus may an animal starve to death with food in its mouth or beak, because it no longer swallows until the food reaches the fauces, where it then calls forth the involuntary reflex movements of swallowing.

If the hemispheres are removed in layers, the movements called forth by sensitive impressions become weaker and weaker in degree, the deeper the section goes, and the more brain mass is taken away. But already in Flourens (*Recherches expérimentales*, etc.: Par., 1824, p. 98) the correct observation is found, that this diminution does not proceed from a single organ, but rather that all the organs of sense sustain a blunting in a similar degree, or in other words the activity of the higher organs or of the cycle of ideation vanishes.

The loss of blood in the operation, and the disturbance of the circulation, may in the first place also impair the yet uninjured parts. If the operative interference has not been too severe, then may the sensory functions gradually more and more return.

After extirpation of only one hemisphere, Schiff saw no alteration or weakening of the animal movements occur. If the operation was executed with caution, the animals conducted themselves just like other animals which had sustained a considerable loss of blood. But we may conclude from this that the will still exercises its influence on the corpora striata which I have previously indicated as the seat of the motory volition, and also that the memory is not lost. Indeed, there are also cases known where, in the human subject, one hemisphere was found entirely destroyed without the intellectual power being lost.

Very remarkable are those experiments relating to the corpora striata. Schiff removes the hemispheres in a rabbit so that the corpora striata lie bare, and then he removes the latter also with great care, without touching sensitive fibres and without causing pain. The animal now remains sitting quietly, as if it had not suffered anything, and displays no impulse to run away. It sits there in its own accustomed posture, a proof that it is able to maintain its equilibrium. If one now carefully seizes a hind foot and extends it, the animal allows this limb to remain, and does not draw it forward again. If one now stretches out the other hind foot, so that its belly comes to lie on the ground, the animal remains in this position, as if it were paralyzed. One may also displace the fore feet laterally, so that the animal lies upon its thorax, and it is here quite unimportant whether the feet have a symmetrical position or not. Now one may again bring back the feet into their natural position, and they support afresh the posterior part of the body. But an animal with paralysed limbs would fall down. The rabbit is become as it were cataleptic. If one now applies at any spot a stronger pressure, then the animal rises up suddenly, stretches its head and ears upwards, and executes at first slow regular jumps. Certainly in an apparently exhausted animal only weak movements could be expected; but with every jump the strength appears to increase, the movements become constantly quicker, and if there is only space the animal rushes forwards in blind irrepressible haste until at last it strikes on some impediment, and on a sudden remains standing. Instead of assuming the sitting posture however, with its limbs drawn up, it remains immovable in that position in which it was placed by the collision, namely, the hinder limbs extended or half raised, and the nose opposed to the impediment. It is surprising what great distances an animal can traverse with constantly increasing speed, provided it meets with no obstacle. When once springing, it goes so fast that no man can follow it. An explanation of this remarkable phenomenon is not difficult. In all these movements the real will is excluded; they follow passively as in a leathern doll (*ledernen Puppe*), as soon as the moving apparatus is once set going. If the animal once begins to jump, it can no more bring its movements to a termination by the influence of the will, but is circumstanced like a running down clockwork.

Schiff now raises the important but difficult question, What is the seat and action of that power? If he took away other parts of the brain lying further backwards, then the above mentioned phenomena did not occur. But a removal of the corpora striata was not indispensable, for the same result became apparent on section of the fibres which pass, radiating from the anterior and outer edge of the corpora striata, into the hemispheres, that is to say, the so-called corona radiata through which the connection between the hemispheres and the corpora striata is brought about. On this ground Schiff regards the corpora striata as the beginning of the hemispheres.

According to this explanation the corpora striata would not be the apparatus for movement, and Schiff directly supports the assumption that they have nothing to do with movements. Thus much is certain, that if after their removal such rapid movements can still occur, the proper centrum motorium must be behind the corpora striata, where the crura cerebri enter into the thalami.*

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* R. Wagner (*Gött. gel. Anz.*, Feb., 1860, s. 58) seeks the centrum motorium in the substantia nigra of the crura cerebri; however, I have scruples against this assumption. Injuries of the corpus striatum have for certain, paralysis as a consequence, and if softening of the substantia nigra occurs, then the fibres coming from the corpora striata also suffer at the same time.

Hitherto, I have always been of the opinion that our will acts directly on the corpora striata, and not merely through the hemispheres. This assumption is founded chiefly on the consideration that, as I have had opportunity to observe myself, tubercles, apoplectic effusions, and destructive processes between the corpora striata and the cortical layer are not always followed by paralysis, which on the other hand seems never to be absent in extravasations into the corpora striata. Moreover, how the will is able also to act from the hemispheres on the corpora striata I have already explained above, and have referred to the example of the painter who brings on the paper the picture designed in his imagination.

I have never been able to conceal from myself that there are difficulties in assuming that our will acts simultaneously on two different points, namely, in the cortical layer, and in the corpora striata. I may, however, in reference to this, refer to the circumstance that the perception of light certainly follows in the corpora quadrigemina, inasmuch as the removal of the hemispheres appears not to be followed by complete blindness, whilst the taste at least is certainly quite lost after that operation.

That no function is assigned to the corpora striata, which appear early in the embryos of all vertebrata, and are never absent, is impossible to suppose, as is expressed in the proposition of Schiff, which runs thus: these parts of the brain have no peculiar attributes and in a physiological point of view, they cannot be separated from the hemispheres.

If the will acted from the hemispheres on the corpora striata it would be very difficult to comprehend why the removal of one hemisphere is not followed by paralysis of the opposite side of the body. Flourens (*Recherches expér.*, p. 29) sometimes perceived after this operation a weakening, which, however, soon disappeared. But Schiff ascribes this only to incidental causes, which may act in a disturbing way for a certain space of time; for if the extirpation of only one hemisphere is executed with caution, in rabbits, dogs, cats, marmots, then only such weakness occurs, as will generally be observed after loss of blood, and it very soon passes off. A pigeon, both of whose hemispheres have been extirpated, flies if it is thrown in the air, maintains its equilibrium in its course, and if it is laid on its back, stands up. From this we perceive that the will is not completely lost, but still acts in the corpora striata. It was already prominently stated in the report of the commission appointed on Flourens's experiments, that Flourens had by no means proved the complete loss of perception in consequence of extirpation of the hemispheres, although perception is not manifested, and the memory is wanting. This is also proved by the experiments which Longet (*Traité de physiologie*, 1850, t. 2, p. 240) undertook in reference to this point. He brought a pigeon, whose hemispheres had been extirpated, into the dark. If he approached quickly with a bright light, then the iris contracted, and even the opening of the eyelids became smaller; indeed, when he moved a lighted candle round in a circle, at such a distance from the animal that the heat could not affect it, it made corresponding revolutions with its head. If, when its eyes were shut as was generally the case, a pistol was fired, then it opened its eyes, raised its head, stretched its neck, and relapsed again into sleep. He also observed that kittens whose hemispheres had been removed, made movements with their jaws and tongue, after the introduction of colocynth, just like other animals who wished to get rid of a nauseous taste.

The above-mentioned Commission on Flouren's Researches also denoted the cerebral hemispheres as the receptaculum in which perceptions attain their completion, where sensuous feelings assume definite form, leave impressions behind them, and by that, supply substantial material for the judgment: an apprehension which entirely agrees with my own.

I may, therefore, assume that vivisections completely confirm those conclusions to which I have been led on quite different grounds; the cerebral hemispheres are not the primary organs for perception; rather in them the sensitive impressions are collected into ideas and images. It is also in agreement with this that after extensive destruction of the cortical layer by inflammation or by atrophy, the phenomena of stupidity and dementia occur without the perception of sensitive impressions being lost, provided only that their centres have not sustained injury.

SECTION 10.—*The Cerebellum.*

Of all parts of the brain, in my opinion the cerebellum opposes the greatest difficulties in regard to the discovery of function.

Flourens, Hertwig, and others have observed that injuries of the hemispheres of the small brain, or even removal of it, exercise the most important influence on the movements of the body, which indeed are not suppressed, but whose full domination appears to fail. On that account, the co-ordination of movements was attributed to the cerebellum. Against this view is the circumstance that a frog whose great and small brain have been removed, still jumps and executes regular movements when one of his feet is irritated.

R. Wagner (*Gött. gel. Anz.*, 1860, No. 4, s. 36), from his examinations arrives at the conclusion that the cerebellum is a purely motor apparatus of the brain, which has absolutely nothing to do with the perception of sensitive impressions, or the formation of ideas, and which is likewise not, or only very distantly, connected with the organic functions. It appears to him that the cerebellum although exercising some influence on the regulation of the symmetrical movements, especially the movements of walking, yet cannot be regarded directly as the regulator of the bodily movements. Man, as well as animals, after considerable injuries of the cerebellum, can still move the single limbs, but they have not the trunk and the posterior limbs well under their control.

According to Schiff, the same symptoms follow injury of the cerebellum, as those which we perceive after injury of the fibres, radiating from it, *e.g.*, of the pons Varolii. If the injury does not occur symmetrically on both sides, there arises an unequal attitude of the vertebral column, and consequently irregular movements begin. Lastly, he nevertheless pronounces that the functions of the cerebellum are still entirely unknown.

That the cerebellum is especially destined to secure the equilibrium of the two sides of the body, or at least to bring the latter into closer combination, we may well conclude from the course of the fibres. The pons Varolii stands in the closest connection with the pyramids, which, however, appear to serve exclusively for movements of the limbs. Behind or above the pyramids lie the different centres of the sensitive and motor nerves, and near them the accessory ganglia of the olivary as well as the restiform bodies, which represent another system of fibres radiating from the cerebellum. These pass over into the arciform fibres, which reciprocally connect the parts lying behind the bridge. A third double tract of fibres, the crura cerebelli ad corpora quadrigemina, courses laterally along the so-called hood, and, according to Stilling, these fibres decussate in the crura cerebri. Now whether these fibres, as Wagner thinks (*Gött. gel. Anz.*, 1860, Jan., s. 35), serve to convey impressions from the great brain to the cerebellum, or whether centripetal and centrifugal fibres occur in all the crura, this appears to me most probable, that the bilateral movements are controlled by the cerebellum, and, indeed, in a reflex manner.

SECTION 11.—*The Circulation in the Brain.*

In order to be able rightly to understand the lesions of the brain occurring in mental diseases, it is necessary to keep in mind the relation of the circulation to the vitality of the brain. For it is evident enough that an unequally strong pressure of the blood, the more arterial or venous condition of the blood, as well as other modifications of it, cannot remain without important influence on the brain.

Daily experience teaches us that violent congestion of blood may interrupt the functions of the brain, and speedily lead to a fatal termination. Let us now look at the means and precautions by which a violent congestion of blood may be moderated or prevented. If, through increased activity of the heart, the blood is more powerfully and under greater pressure driven into the aorta, it runs off, for the most part and quickest, through those vessels in which a less resistance and counter pressure have to be overcome. But if we look at the branchings of the great vessels, it is certainly very remarkable that close to the vertebralis the thyreoidea inferior arises, and at the division of the carotis communis into the carotis interna and externa, the thyreoidea superior goes off. The constant doubling of the thyreoidea on each side, shows that a definite purpose is to be attained by it, and that it is not merely to secure a copious supply of blood to the thyroid gland, for the latter object would have been very simply attained, if one of the two thyreoideæ had received a greater calibre. But the thyroid gland can take up much blood, and it appears to be able to expand itself powerfully, since Forneris considers that he has ascertained by measurement that in consequence of this expansion or swelling, the neck is larger during sleep and on awaking than during the day. Also in the dead body, the size, the consistence, the vascularity of this gland differ remarkably. We may then well assume that the propelled blood finds less resistance in the two extensile thyreoideæ than in the vertebralis and in the carotis interna, which, on account of their course through long canals, can increase only slightly in diameter and not at all in length, and on that account it flows off in greater quantity towards the thyroid gland. Therefore, without prejudice to other functions which are possibly also entrusted to it, the thyroid may be regarded as a diverticulum or reservoir, by which a too-strong pressure of blood may be diverted from the brain. Moreover, the position of the origin of the thyreoideæ in proximity to the vertebralis and carotis interna, yet gains in significance, as this arrangement is not limited to the mammalia. For, according to J. Simon (*On the Comparative Anatomy of the Thyroid gland*, in *Phil. Transact.*, 1844, p. 295), the thyreoideæ of the bird arise exactly opposite the place where the carotid and vertebral come off, and even in amphibia and fishes these vessels stand in relation with the vessels of the brain.

From this it becomes not improbable that the presence of a goître, which receives a great deal of blood, and which may derive too powerfully from the brain, induces in cretins a weaker development of the brain, or, at least, a debilitated energy of it, although cretinism is not to be regarded as a product of the goître, but only appears to be frequently present with it. It might also in this way be explained why individuals who are afflicted with goître, for the most part are not very lively and active, but appear to be more phlegmatic. It may also be connected herewith, that I have sometimes, in meningitis chronica and meningitis idiopathica, found a small indurated yellow-tinged thyroid gland, because through this condition the derivation of the blood-stream from the brain would be impeded, which then led to repeated congestions, and contributed to the development of meningitis. I should at least wish this point to be regarded in future examinations.

The spreading also of the vessels in the face conduces to derivation from the brain. There are not many other arteries which are so easily filled with blood, and extended, as the arteries of the face; they are everywhere surrounded by soft fat, and on that account the coats of the vessels have no powerful support from without. Thence it occurs that the cheeks, and indeed the whole face so easily assumes an increased colour, *e.g.*, in powerful and sudden emotions, especially also from high degrees of temperature. If the vessels of the brain could be as easily filled, we should have to fear an apoplexy from every rather active exertion. But the carotis externa thus leads the strong pressure of blood outwards, because the carotis cerebralis in the closed cavity of the skull cannot equally well expand, and on that account opposes a more powerful resistance to the pressure of blood. Therefore, from diffused redness of the face, we may not always conclude that there is congestion of the brain, although the latter is frequently associated with the former.*

Similar conditions occur with the vertebrales. These arise from the subclaviæ, and with strong pressure of blood the stream can be derived from the vertebrales towards the arm. For this reason may hand-baths, placing a bandage round the arm, or even the finger, stop bleeding from the nose; this I have many times experienced with the best effect, and in earlier years was accustomed to verify on myself.

The resistance against a strong blood-pressure is still more increased by the brain and spinal cord being inclosed in bony cavities, which are capable of no extension, and, under ordinary circumstances, must always contain the same mass of solid or fluid contents, as no elastic structure occurs in them. Hence it has been assumed, that generally no increased quantity of blood can proceed to the brain, as the latter is not capable of compression. But in apoplexies we often find large quantities of extravasated blood.†

Therefore, the liquor cerebro-spinalis can afford room for a larger quantity of blood, whilst it escapes out of the cavity of the skull into the more lax and movable sac of the dura mater spinalis, which in the natural condition appears not to be very full and tense. For if we carefully open the vertebral canal, so that the dura mater is not injured, the sac may be inflated to a larger size. For although the skull cavity is not thoroughly unalterable, the blood vessels have yet a stronger support from it, and it opposes a stronger resistance to too great filling with blood. But a certain scope was indispensable, as every exercise of power, consequently also activity of the brain, demands a more active circulation and increased change of material, on which account a powerful and continuous mental exertion occasions phenomena of congestion, and at last induces the feeling of heaviness, dulness, and fatigue.

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* The researches of Sucquet (*Schmidt's Jahrb.*, 1862, No. 1, s. 20) correspond with this. He has demonstrated, in addition to the proper capillaries, also larger communicating branches between the arteries and veins, and indeed in the hand and elbow, in the foot and knee; even in the face, in the skin of the lips, nose, eyelids, eyebrows; of the ears, in the mucous membrane of the cartilages and septum of the nose. He correctly claims for these anastomoses a derivative purpose, as in strong arterial pressure the blood will be carried on more quickly through them towards the veins. In old age these communicating branches increase in number and size.

† I possess a preparation where the blood is extravasated in so great quantity between the dura mater and the skull that the coagulated mass of blood, on opening the skull, was bigger than the fist, and had pressed the hemisphere quite flat. The blood was freshly coagulated, its extravasation had occurred but recently, and with great rapidity, so that death must have been immediate.

Long ago, Kellie (*Ueber den Tod durch Kälte und über Congestionen des Gehirns in* Fr. Nasse, *Sammlung zur Kenntniss der Gehirn und Rückenmarks-krankheiten*, 1 Heft, 1837), and Dieckenhoff (*De remediorum quorundam vi sanguinem cerebro et meningibus contentum diminuendi :* Bonn) busied themselves with experiments on this subject. Kellie claims the discovery that on account of closure of the skull, the blood is retained in its cavity, and therefore, after a fatal hæmorrhage, the brain does not appear so bloodless as the other parts of the body. But, on the other hand, if through preliminary trephining, he permitted the entrance of air into the cavity of the skull, then he found the brain also bloodless. Dieckenhoff, however, could not corroborate this statement, and I have myself found the brain quite pale and bloodless in rapidly fatal hæmorrhages. Nevertheless, it appears to me that Kellie's assumption is not entirely to be rejected. For the most part we find the brain of the slaughtered sheep not quite bloodless. But if the vessels of the brain become emptied through hæmorrhage, the space must be filled by something else, and, according to Kellie, it is by serous exudation. We may, however, assume that in a rapidly fatal hæmorrhage the serous fluid runs from the spinal canal into the skull cavity, and supplies the place of the diverted blood. The space forming in the spinal canal, must then be balanced by filling and distension of the wide venæ spinales, which veins communicate with the venæ cephalicæ, and stand in reciprocal relation.

Nevertheless, the blood will be retained, if not completely, yet longer in the brain than in any other organ.[*]

In lessened blood pressure, after copious loss of blood, a more active exudation of serum may easily occur, and this well explains the recognised observation, that obstructions of blood operate so deleteriously in the insane, especially in melancholic patients. If serum is once exuded, it opposes a more active circulation, the brain remains, therefore, longer anæmic, and softening of the brain and imbecility may be induced by the exuded serum. This happens in such cases frequently enough after venæsection.

If the vessels of the brain have become distended in consequence of a strong pressure of blood, as is often the case in chronic insanity, there are yet other ways of passing off, for the superabundant blood. If the blood in the skull cavity is under a stronger pressure than in the face, it has an outlet through the art. ophthalmica; and the nose, and, through the frontalis, the supra-orbital region, acquire a deeper colour. If the congestion has a more chronic course, as in many cases of acute mania, then only the tip of the nose is more deeply coloured, even to bluish. But the same also occurs in melancholic patients. Hence we also observe in confirmed tipplers, in whom for the most part habitual brain congestion exists, so generally a red or bluish swollen nose. As the ophthalmica, through the ethmoidalis anterior extends along the septum narium as far as the tip of the nose, and likewise the skin of the nose externally is in connection with twigs of the ophthalmica and angularis, we may easily comprehend how it is that the ophthalmica is diagnostically so significant, if the blood sustains a stronger pressure in the cavity of the skull and partly flows off through the ophthalmica.

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[*] In *post mortem* examinations, when the existence of brain congestion becomes a question, we must bear in mind the suction power exerted on the blood. The brain and brain fluids contract on cooling of the body, and the blood in the veins, which still remains fluid several hours after death, is partly driven back to the brain in order to fill the space formed through its shrinking. Nasse (*Untersuchungen zur Phys. u Pathol.*, Bd. 1, s. 387) has already pointed this out. Thence also may it arise that the blood in the veins of the brain is mostly not coagulated, because the fibrine remains behind, and only the fluid blood returns into the cavity of the skull; therefore, in sections, the filling of the vessels of the brain gives no accurate measure of their condition during life.

On the other hand, we have in the colour of the sclerotica, an entirely uncertain sign. Its vessels appear, in cerebral irritation, sometimes to contract under the influence of the nervi ciliares; at least I have myself observed the sclerotica still white in very intense cerebral congestion of several days' duration, and in apoplexies.

We therefore assume that bleeding from the nose is a favourable event in congestions of the brain. If it does not occur of itself we apply a leech in the nose, from which I have several times seen the best result.*

The vertebrales before they enter the cavity of the skull give off muscular branches which communicate with the auriculares posteriores. I ascribe it to this, that children, as I have many times observed, shortly before an attack of convulsions have the ears quite reddened; indeed this appearance may occur when there is merely great tendency to convulsions. In some maniacal patients the nose is coloured, and in others the ears, which I explain in this way—that in the first, the congestion occupies rather the anterior portions of the brain, in the latter rather the posterior portions. Thus, also, it may be explained why in congestions, repeated cuppings in the neck act favourably; in recent cases of epilepsy especially I have obtained very happy results from this practice.

If the flowing off of blood through the veins is impeded, as, for example, in asthma, then the sinuses of the skull are filled, so that the vena ophthalmica cannot easily empty itself into them. The external veins must receive its blood, and an enlargement of the veins of the sclerotic takes place (on which the ciliary nerves exert a weaker influence), through which the sclerotic acquires a brownish appearance; and the eyelids, especially the lower one, show a violet colouring similar to the tip of the nose. Together with the other diagnostic signs of venous congestion, as it occurs, for example, in the climacteric years, or sympathetic with uterine diseases, the deeper colour of the lower eyelid acquires a decided value.

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* To explain this relation, I have frequently injected the ophthalmica alone in the skull cavity. The forehead, the tip of the nose, and the cheek were coloured thereby.

Upon superficial observation it might appear as if the firmness of the vessels of the brain was impaired by their walls being thinner; but the walls of the vessels seem to be thinner rather for the purpose of avoiding rupture of the capillaries. For the middle muscular coat alone is almost entirely wanting; through its contraction the blood experiences a stronger pressure, and is driven into the smaller vessels; but on the other hand, the inner and outer coats of the vessels, afford to the latter their proper firmness and power of resistance. From absence of the muscular coat, the walls of the vessels yield more easily to the stream of blood, offering less resistance to it, and also driving the blood with less force through the capillaries which in the brain are so delicate, and receive so little support from without. The consequence of this is a more even, not pulsatory, stream of blood in the capillaries of the brain. For while the larger vessels which form numerous anastomoses run a considerable distance on the pia mater, although on account of their easy distensibility they readily yield to each stroke of the pulse by reception of the inflowing blood-wave, no pulsation is conveyed to the smaller vessels of the brain by them. In this, also, may be sought the significance of the *rete mirabile* which occurs in the skull cavity of many mammalia, namely, in the ox, sheep, and deer.

But nature has taken even still further care. As is known, the pia mater covers the cerebral convolutions, and from its under surface very fine capillaries pass into the grey substance, where they inosculate freely and then pass into fine veins, which again return to the pia mater, and here unite into larger branches. Now, if the blood in the vessels of the pia mater, in order to pass into the veins must all go through the cortical layer of the convolutions, every more active determination of blood, for example, even in any violent movement must immediately manifest itself, in so easily excitable a cortical layer. But that is not the case, and indeed for this reason, that in the pia mater itself, a free communication exists between the arteries and the veins, of which I have convinced myself by means of injections.*

Thus in a violent congestion, the blood for the most part, passes away over the cortical layer, without acting on this, into

* The brain is to be taken out of the skull in such a manner, that at least the upper part of the dura mater together with the sinus remains attached to it. Then a small pipe is to be placed in the divided carotis or vertebralis, and ligatures are to be applied on the other arteries; likewise a canula is to be introduced into the sinus longitudinalis, just where it passes into the sinus transversus. If now we inject alternately red size into the arteries, and blue size into the veins, we may distinctly see that the red size passes directly into the veins, and that on injecting the veins the red size is again passed back into the arteries. This certainly speaks strongly in favour of a free communication; of course the brain must be taken out with the greatest possible care so as to avoid all bruising.

the veins; the storm, as it were, sweeps away over us without our perceiving it.

However, the effect of such a congestion always makes itself known. Suppose a good friend, in rapid course, panting and heated, were to reach us. If now a complicated question, a difficult calculation were laid before him, he would reply that he must first rest himself somewhat, that he was not at the moment sufficiently composed to think over so important a question. The cells in the cortical substance are at the moment in a condition of too great excitement, the ideas and images chase one another, and are not under control; deeper reflection requires a previous calming of the circulation. If the rapidity and strength of the circulation increase still more, as sometimes in fever, then delirium may be reached; the involuntary ideas and images gain in strength, so that they are no longer to be distinguished from real impressions.

Further, regard is due to the sinus duræ matris, which are capable of no distension. If by impeded respiration, the outflow of blood from the jugular veins into the chest is hindered, the accumulation of blood in the skull nevertheless meets a resistance, on the one side, from the closure of the skull itself, on the other side, because the sinuses cannot extend; by means of the numerous anastomoses between the venæ spinales and the azygos, the blood can then collect more in the abdomen.*

I will also mention that the brain floats in the liquor cerebro spinalis almost as in a bath, so that, according to the researches of Toltz (*Prager Vierteljahrsschr.*, 1855, iv. s. 99), it presses on the base of the skull with only one-fiftieth of its weight. We must here remember that the arteries, which on account of their power of expansion can endure a greater pressure, all lie on the base of the skull, but the easily compressed veins are collected on the surface of the hemispheres, and have their position mostly in furrows between the cerebral convolutions, so that they are not compressed by turgidity of the brain, and consequently the flow of blood back from the brain remains as free as possible. Moreover, between the branches of the arteries, as well as between the veins, numerous anastomoses are everywhere found, and with increased flow of blood, no violent congestion of the brain can occur, because the pressure is divided equally on all the arteries and veins. Without this disposition a stronger flow of blood, through one of the cerebral arteries, would immediately have as a consequence a stronger congestion in a particular section of the brain, through which dangerous extravasations of blood would easily arise. Now, also, when from any cause the flow of blood is cut off at one place, the blood may pass through lateral branches, so that the circulation still continues. Nevertheless we see in embolism of the vessels of the brain, that such an obstruction may be very deleterious, as soon as it extends over a rather large region.

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* If one propels blue injection size upwards through the jugulares, one sees it pass easily from the inferior vena cava into the heart, because the wide Plexus venosi spinales anastomose with the venæ lumbales, and through them are connected with the inferior vena cava. An interesting experiment of Toltz (*Gaz. med. de Paris*, 1853, No. 10, u. *Prager Vierteljahrsschrift*, 1855, iv., s. 99), supplies a further proof that the blood, when a strong pressure is acting within the skull easily makes its way outwards. He tied the jugulares internæ and externæ, then laid bare the sac of the dura mater at the end of the spinal cord, and inserted a canula, through which he syringed water into the sac of the arachnoid. From this, the previously corpse pale face immediately acquired a bluish colour, and the veins above the ligature were filled.

Through all these harmoniously combining causes it becomes possible that the brain with its vessels, notwithstanding the delicate structure of the latter, is in a position to sustain a considerable pressure. We see this in difficult parturitions, in asthma, in hooping-cough, in epilepsy, where the small vessels in the loose tissue of the eyelids, which arise from the ophthalmica coming out of the skull, burst in consequence of the great congestion of blood, without any extravasation occurring in the brain itself.

Of great significance, also, are the observations on the circulation during sleep, which we owe to Arthur H. Durham (*Schmidt's Jahrbb.*, 1861, Nr. 4., s., 13). The opinion was general that in sleep a larger quantity of blood is accumulated in the brain, and that augmented venous congestion in reality caused the coming on of sleep. The increasing sleepiness in great plethora appeared to be in favour of that view, similarly the accumulation of blood in the brain in coma, the occurrence of sleep after an epileptic attack, where evidently congestion is present, and not less the state of unconsciousness in apoplectic effusions, or in capillary injection of the vessels of the brain. This much, however, seems to follow from Durham's inquiries, that we must clearly distinguish tranquil sleep from coma and from sopor. A portion of the vault of the skull was removed from a dog with the trephine, and then the underlying dura mater excised; the uncovered part of the brain appeared inclined to press into the opening, the large veins on the surface were somewhat distended, the smaller vessels of the pia mater appeared to be full of dark blood, and no decided difference of colour between arteries and veins could be perceived. Such was especially the appearance and condition during the action of chloroform. After the action of the chloroform had ceased the animal fell into a comparatively natural and sound sleep; thereupon the surface of the brain became pale, and sank rather below the level of the bone, the veins were no longer distended, little vessels having an arterial colour could be distinguished, and many which before swelled with dark blood could no longer be recognised. When after some time the animal was awakened, a weak red colour appeared to spread over the surface of the brain, and the latter again pressed into the opening in the bone. The more active the dog was, the more the pia mater became injected, and the more turgid was the reddened brain; everywhere vessels, which during sleep were not visible, showed themselves, and arteries and veins could be accurately recognised by their different colour. The animal was now fed, and then again sank into quiet sleep; the blood vessels again became narrower, and the surface of the brain pale as before. The difference in these appearances was the more firmly established as two animals under opposite conditions were observed. Lastly, the state of the vessels was examined with a strongly magnifying lens, and, indeed, under weak microscopical power. The trials were several times repeated with exactly similar results. Dogs were found to be more suitable than rabbits.

A different atmospheric pressure could not come into consideration in these experiments, for this was the same both in the sleeping and waking state, likewise the appearances did not alter when accurately fitted glass plates were set in the opening of the skull. The explanation of the phenomena Durham finds in this, that during sleep, vascular action and congestion towards the brain exist in a less degree. In the waking state, and when the brain is in activity, it receives more blood which also moves more rapidly through the vessels, and the brain substance is more oxydised; for the functional activity of the brain demands a greater consumption of oxygen, and this vis a fronte occasions a richer supply of arterial blood, enlargement of the capillaries, and increased change of matter.

The increased rapidity of the circulation causes a more copious supply of oxygen, and probably also a more active taking up of the products of decomposition into the blood. For, according to Durham's experiments, if fluids are allowed to stream through a rabbit's intestine, which lies in a surrounding fluid, the quicker the stream is the less will transude outwards through the wall of the intestine. Now, during sleep, the vis a fronte diminishes; on account of their elasticity the vessels contract more and the nutritive circulation is predominant; fewer blood cells circulate, and the slowness with which the blood flows favours the escape of nutritive plasma.

The immediate cause of temporary suspension of cerebral activity cannot be a failure of active material, or that this is exhausted by oxydation; for the already fatigued brain may be brought to renewed activity through suitable stimulation. Durham finds this cause in the products of decomposition, and appeals to the observation that the brain substance of an animal just killed has a neutral or even a slightly alkaline reaction, but shortly after influence of the atmosphere is, on the contrary, acid. Still Heynsius, before Durham, found that the quite fresh brain of the sheep or of the ox, had an acid rather than an alkaline reaction; this was confirmed by Funke, who, at the same time, ascertained that in increased activity of the brain an acid reaction, and in inactivity of the brain, an alkaline reaction is present. Heynsius (*Nederl. Tydschr, v. Geneesk*, 1859, p. 651) has further demonstrated that the diffusion or exosmosis of albumen is impeded by acid, and is promoted by alkali. Thus, if after long activity, in consequence of oxydation, acid has accumulated in the brain, then less albumen transudes out of the blood vessels; the change of material, or rather the supply, is less, and only during rest can the acid fluid be taken up and carried away, through which the organ then becomes fitted for renewed activity. This formation of acid would thus be a corrective of over-irritation or immoderate exertion of function. According to Durham, acid prevents the oxidation; according to Heynsius, it limits the transudation of albumen. Durham thinks that the nutrition is increased during sleep: Heynsius assumes that there is then increased absorption and diminished deposition of albumen, consequently a weakened nutrition.

To me it appears more probable that while during waking the change of matter is increased, with which of course a greater supply of oxygen as well as of albumen must be combined; during sleep, on the contrary, the deposition and nutrition are more active, whereby, at the same time, the acids formed are carried away.

We may consider that sleep arises not so much from lessened supply of arterial blood, as from diminished change of matter, thus from diminution in the supply and apposition of new substance. Diminished supply and weaker oxidation may also occur, if in derangement of the circulation the vessels are considerably distended with blood, and if from powerful resistance the circulation becomes slow; the renewal of the blood in the capillaries then follows too slowly, and its venosity increases. Coma and sleepiness thus need not be always the consequence of congestion and sluggish circulation; contraction of the vessels can likewise induce it, as well as a lessening of the oxidation and nutrition through preceding exertion and formation of acid which impedes nutrition. The essential cause in both cases lies in a lessening of oxidation. Thus also the fœtus appears to be in a lethargic condition, before the commencement of respiration, so long as its blood is only weakly arterial, and oxidation is absent; only after the beginning of respiration does it awaken out of this state, and it gives evidence of this by half voluntary movements.

SECTION 12.—*Connection and Mutual Relation between Body and Mind.*

In all times disputes have been held regarding the connection between the mind and the body, and the most widely different hypotheses have been put forth on this subject. The psychical school disregarded the influence of the body on the mind, and considered all the phenomena of insanity only as abnormal actings of the mind. On the other hand, if the existence of a mind was denied, all spiritual activities were stamped as expressions of the life of the brain, or crowded together in a labyrinth of incomprehensible and complicated reflex phenomena; and upon this conception, a mere machine or automaton was made out of a human being.

According to my conviction we must clearly separate the functions of the brain, which have different results according to their various purposes, and according to the condition of the active cells, from a higher principle, namely, an independently operating mind, which, as was before signified, is in the most intimate way connected with those cells, and receives impressions through them, but which again can act independently upon them, and by this arbitrary acting is distinguished from all other powers of nature.

This absolute will acts nowhere but in the brain; in this alone is our consciousness rooted. Pflüger, and others following him, speak indeed of an unconscious will in the spinal marrow; but even the idea of an unconscious will contains a contradiction. If a nerve or the spinal marrow is divided, automatic or reflex movements may occur in the separated part, but never spontaneous or voluntary. We feel that the seat of our consciousness is in the head alone, and the body really finds itself outside the *ego*, that we act on the body as on an apparatus in which our mind dwells not.

The cells in the brain develop an activity which communicates itself to the mind, be it as perception of a sensitive impression, be it (and this is the principal thing) as idea or image, as reproduction of a previous perception. Thus we stand in the closest connection with that cell-activity. For as it may communicate itself to our mind, so on the other hand may our mind act on the cells in the cortical layer; we are in a position to set the cells in activity, and to present to ourselves a dormant image. Yet the functions belonging to the cells must not be confounded with the *ego;* the organic power acting in them, finds itself dependent upon their composition and they are accessible to other excitants besides our will. If the cells are irritated, in the way of inflammation, as in insanity, or through abnormal condition of the blood, as in nervous fever, then the images appear involuntarily, and we are delirious.

Could any one, indeed, contend that the violent spasms in an epileptic attack exhibit abnormal actions of the mind? The organic power acts here for itself, therefore not according to our will; it is not identical with our higher principle, but rather subservient to it. If, through an apoplectic attack the implements on which our will acts, become affected, then paralysis occurs—that is to say, the capability for movement is lost, but not the will for their execution, from which it may be distinctly concluded that the activity of the brain is not the same thing as the mind or higher principle. It will surely not be maintained that by means of *flores amicæ* or of galvanism, through which anæsthesia or paresis would be removed, the lost activity of perception or the lost will, would be again restored to the mind? Only the instruments with which our mind works are again brought to the normal state. In this relation between the higher individuality and the functions of the brain, we have the connection between mind and body, by means of which both act interchangeably on one another. But the connection is so intimate a one, that every increase of energy of the brain, every alteration or exhaustion of it soon re-acts on the mind, in the one case raising and straining, in the other depressing and blunting.

This involuntary influence of the body in general, and of the brain in particular, displays itself under special circumstances in a more or less decided manner; indeed, even exhibits itself in peculiarities in the disposition and character of different individuals. It is the cause why in our actions so often something involuntary, a certain blind impulse, is in operation.

Indeed, the occurrence of the voluntary and involuntary in our actions is one of the most difficult problems. Most explanation is afforded to us by the accurate investigation of diseased conditions, where the activities occurring, belong to the involuntary, and according to the different degree of their manifestations, can be most readily distinguished.

It has, moreover, been explained above that the brain cells, those, namely, in the anterior parts of the hemispheres, not only achieve images, but can also recall the presence of earlier received impressions, which impressions are sometimes involuntarily communicated to our mind, sometimes through our mind again increased in liveliness and intensity. The faculty of imagination belongs, therefore, also to that mental power which stands in the closest connection with the functions of the brain. If those cells are in activity, it depends entirely on the degree of excitement, whether the involuntary has the upper hand, as in delirium, or whether the mind governs the images, and voluntarily produces, through quiet ruling, bold creations of fancy, such as we admire in the plastic works of a Michael Angelo, in the *Jerusalem Delivered* of a Tasso, or in Beethoven's masterly compositions. These cells of the cortical substance thus mediate the connection between mind and body. If, on the one hand, through these cells involuntary images are called forth, as in sleeping and dreaming, so, on the other hand, are we able to act upon them, and set them in operation, so that this or that image arises for us, which at a previous time had been laid down there by sensitive impressions. Hence the old saying: *Nihil est in intellectu quod non ante fuerit in sensu.* The cortical cells first receive the impressions through the perception cells of the sensitive apparatus, and while the impression in the perception cells soon vanishes, it remains as it were slumbering in the cortical cells. These latter are the store-place or magazine for the treasures of our recollection; if they have once re-acted on an impression, and have become set in activity, then they appear to retain the impression, in order afterwards to act in the same way on a mental stimulus, as formerly on a sensory stimulus.

This effect of sensory impressions on the cortex of the brain, must be clearly distinguished from the impressions themselves. Let us imagine a blind man who feels a triangle. He first finds one angle, and then passing the finger over the object he finds also the two other angles. These impressions are conveyed to the perception cells of feeling, and from these delivered to the cells of the cortex of the brain, where the different impressions are by the mind combined into a whole, so that the triangle is perceived. Such a course of events can be possible only by the impression here not being obliterated so quickly as in the perception cells. If the impression remained some time in the latter, the observation of the first angle would coincide with that of the second and third, and the perception of the three different angles, and their combination in the brain cortex into one body, namely, into a triangle, would be impossible. Here the isolated impressions are first combined, here also we discern whether different simultaneous impressions through several organs of sense proceed from one object or from several objects. All this is higher action of the mind, and the cells which retain and elaborate the impressions, as images and ideas stand in relation to it as indispensable means. The dependence of the memory upon the condition of the cortical layer of the brain we ascertain from this, that when in old age the latter begins to atrophy, the memory also diminishes, and that in the insane, where through inflammation, the cortical layer has pathologically degenerated, the memory also vanishes. Therefore, the memory is no mere function of the brain, yet for its efficiency the assistance and co-operation of the body are required.

But as this cell activity in the form of images and ideas rises up towards the mind, so also on the other hand can the mind act on the cells, and call forth images in them; it is also in a condition to regulate the involuntarily occurring images, to govern and to unite them into a whole. The involuntary and orderless images passing by us during sleepiness, we may simply gaze at, or we may retain one of those images, bring others into connection therewith, and in this manner compose a romance—a tale. This intellectual capability, we call imagination, fancy; through it does the poet, endowed with creative reason, accomplish his immortal works.

But for this a great sensibility of the cells is required; they must answer easily and readily to the impulse given by our mind, by our will. If their action is dulled by somatic causes, for example, by congestion and over-loading with blood, from which they appear to suffer a certain pressure, or through exhaustion and weariness, then we feel weak and stupid, and the work of the mind will not succeed; we can find no images, perhaps not even words, our spirit is quite subdued; it even gives us trouble to write a simple letter. Thus, like the memory, the fancy is also in dependence on the body. Psychology knows nothing hereof, and is able to give no explanation of, these different intellectual conditions.

With the cells of the cortical brain substance, therefore, our mind appears to stand in closer connection, and in more continuous alternating action, than with the remaining brain cells. Those cells which receive the sensory impressions, communicate to us their action, indeed, but on the other hand our mind is not able to act upon them. We see a picture by means of the light falling on our eyes, but we are not able by means of our will to call forth in the dark the same appearance; we may indeed remember the picture seen, but not with that brightness and clearness in which it actually fell on our eye. Were this possible, we should not be able to distinguish the productions of our imagination, and the real appearances from one another, and thence would incessant confusion arise.

It appears to be a peculiarity of the perception cells, that they are set in activity only through the nerve fibres coming from the organs of sense, and not through our will. In this way it becomes possible that the sensory impressions are kept pure and unmixed. If the will could seize and arbitrarily call forth, for example, a photograph, then would an actually seen picture often enough become as altered and transformed, through one inwardly called forth, as the pictures of our fancy, and we should never be able to decide with certainty on our visual perceptions, as it then would always be doubtful whether our mind had not involuntarily produced some or other alteration in them. The impression must be only momentary, and it must leave no traces behind; otherwise the seen image would remain behind after the vanishing of the object, which must lead to confusion.

Thus it becomes apparent as a necessity, that an apparatus be present which conveys to us the images of actual objects pure and unaltered, yet which retains them no longer than the impression proceeding from the object remains; but beside that, also, a second apparatus in which those impressions are collected and accumulated, only in such force that they can be distinguished from real ones, and out of which we can again call them into appearance in order to combine them with others, and to design alterations in them.

Herewith is the circumstance worthy of observation, that the proper perception cells, which convey to us the sensitive impressions, appear to be able temporarily to suspend their connection with the mind, so that the impressions are no longer perceived, as for example, in sleep. If a portion of the body is during sleep exposed to a continuous action of cold, or if a tight neckcloth exercises any pressure, there does not occur a proper perception of these influences, but impressions are effected in the cortical substance through which arise ideas and images analogous to those which do not depend upon direct sensory perceptions. Thus in sleep the perception cells do not communicate their impressions to the mind. In a dream, on the contrary, the connection between the cells of the brain cortex and the mind is not dissolved. If the imagination in dreams becomes still more vivid, we have somnambulism, in which the individual behaves as if in a waking state. The mind acts so energetically on the imagination cells, that commands from these reach the centres of motion although the connection between the perception cells and the mind is still interrupted.

When our mind acts through the will on the cells of the corpora striata, we may yet doubt whether this is a direct action of the mind, or whether it occurs only through the cortex of the brain. Many reasons appear to me to speak in favour of the view that the mind acts directly on the corpora striata. The extirpation of the hemispheres of the great brain, as before observed, appears by no means to deprive the animal of all free will. Also, I can only explain, on the assumption of a direct action, how the body accomplishes its movements with such facility without the mind thinking of them. If, for example, we are walking with a friend, in earnest conversation, our mind becomes completely occupied with the images called forth by the conversation, and we cannot well suppose that the motor influences relating to the act of walking also issue from the same cells. There appears for this a special arrangement to exist which, in a no-nearer-explainable way, possesses the facility of a clockwork, so that it only needs an impetus to be given, or an impediment to be removed, and the motions then continue of themselves.

In another place (*Bau und Functionen der Medulla spinalis und oblongata*, u. s. w., s. 57 fig.) I have furnished evidence that the combined action of the muscles in walking, the so-called co-ordination, occurs through the motor cells of the spinal marrow. But our will influences these cells from a higher group of cells found above, which appears to lie in the corpora striata, whose elaborate arrangement and connection will perhaps never be distinctly understood; on these cells the mind appears directly to operate.

The facility with which we, almost unconsciously, walk, we must in great part set to the account of frequently repeated movements, through which they assume an almost spontaneous character. The musician plays from memory a difficult piece of music, in which occurs a countless number of movements requiring to be executed with precision; he knows that he thereby gives back the notes; but he is not conscious what movements of the fingers he executes for each note. We perceive from this that the mind can simultaneously think, and give commands for this or that movement. We saw the like already in the walking with the friend, and it is also found in many other instances. A person may dictate to me this or that; I write down accurately what I hear, but at the same time think of quite other things, and afterwards know absolutely nothing of what has been written down. We have here again an evidence that the cells serving for thinking are other than those to which the mind imparts commands for movements, and both sets of cells act independently of one another.

Whether the cells of the brain cortex, varying in size and appearance, are destined for these simultaneous different actions, or whether some convolutions which are in special connection with the corpora striata, as Foville's fourth order, play a particular part, must remain undecided.

But susceptible as the cells of the corpora striata are for impressions of the will, they yet seem not to be in equally close connection with our mind as the cells of the cortical layer, which is justly regarded as the apparatus for the higher mental faculties. The cells of the corpora striata receive indeed the impulse of our will, but our individuality obtains from them no kind of impulse. Also, we feel not wherein the impulse of the will acts, and we have no cognizance of the existence of corpora striata. We certainly recognise the movements executed according to our will, but in another way, namely, through the sensitive nerves, and the cells in activity herewith are surely different from those which regulate motion.

The cells of the cortical substance of the brain, are therefore to man the most important and the noblest; they stand in intimate connection and interchange with the individual, with the mind; they are the material basis of the memory, the proper laboratory of the mind. The mind takes from them images which it voluntarily disposes and sets together, which, by virtue of its higher faculties, it subjects to reasoning judgment, and out of them it developes ideas. But its operation is the more vivid, easy, and rapid, the more regularly the material for thought is brought to it.

In this mutual action are two different faculties in play. First, we have the behaviour of the cells, whereby images, delineations, material for thought, are brought to us; that is an involuntary organic activity which is dependent on the condition of the powers of life, the degree of excitement or irritation of the cells; then, in addition to this, the quality and quantity of the arterial blood reaching the cells, and the diversity of the impressions, conducted in an indirect way to them through the organs of sense, come into consideration. Secondly, we have the operation of the mind, which takes up those impressions and delineations, so that they attain to consciousness, elaborates them, voluntarily governs them, and subjects them to the higher reasoning judgment. But, besides, the mind is able to bring up these images out of its treasure chambers, to produce them according to will and requirement, and consequently to strain the organic powers of the cells of the cortical substance of the brain, through which images, delineations, feelings, inclinations, come to light, all in relation to the different impressions, and to the nature of the affected cells.

As concerns the different kinds of action of the cells of the cortical substance of the brain, it has already been shown that the convolutions lying under the frontal bone, or in front of the central furrow, are destined more for the higher spiritual faculties, the understanding, the formation of ideas;* but on the contrary in the convolutions lying behind that, the disposition and the moral feelings which are also rooted in the somatic system, and are relatively more prominent in women. Moreover, the cells in the posterior hemispheres, at least in some parts have another texture, and they appear to produce no images or delineations, but to manifest their activity only in a peculiar perception, in a kind of feeling, and to give to the mind an impulse, an inclination, from which everything definite is absent. I might almost say, although anatomical authentication is yet wanting, that through the anterior lobes of the brain rather the plastic visual impressions are received, through the posterior lobes rather the perceptions of hearing and feeling. Through the posterior cells the mind receives a peculiar perception and disposition, by means of its faculty of delineation, and indeed with the help of the anterior brain lobes, it gives to this perception form and body. In other words, the anterior lobes of the brain act in a plastic manner, provide material and images for thought; the upper and hinder lobes contain cells for feeling, and mediate peculiar impressions which touch more the disposition and belong to the instinct.

Of these different kinds of action of the different lobes of the brain, I have had opportunity in a tolerable number of sections to convince myself, but I will yet, further on, bring forward some cases as evidence. Here, let the statement suffice, that in insanity proper, in cases of confusion of ideas, and of haughty insanity, I have always found the anterior lobes of the brain suffering, but on the contrary in the melancholic and those who condemned themselves with or without religious admixture, I have found the upper and posterior parts of the lobes diseased, and that, in the latter cases, the understanding often showed no trace of disturbance, inasmuch as the individuals judged correctly and disputed acutely. The pathological affection limits itself, then, to the upper and hinder parts of the lobes, and in the fore parts nothing abnormal is seen in regard to colour, firmness, and connection with the pia mater. In those who had at last finished with dementia, I never found the anterior parts of the lobes intact; they were always adherent to the pia mater, and this could not be removed without injuring the grey cortex. We also find atrophy and decoloration of the cortical layer, and at the same time the pia mater is in such connection with the loose cortical layer, that the latter gives way with the weakest pull. I also found a loosening of previous adhesions, and atrophy of the convolutions, which changes were spread over the whole of the hemisphere.

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* I have already related that in the brain of an idiot in my collection, all the convolutions in front of that central furrow are remarkably small, but those lying behind are of the ordinary size. In another individual, who had not been able to learn to read; who could only wield the blacksmith's hammer, but never understood the filing and other work, and came at last into the Utrecht Institution for the Insane, I found the anterior lobes of the brain yet more considerably atrophied.

Doubtless yet other differences in the cells of the brain cortex show themselves, by which the varying arrangements are explained, according as the one is distinguished by its sense of number, another by its plastic perception. I have already communicated interesting cases where this or that faculty was lost or remained intact. Although I cannot agree with phrenology in the form in which it was put forward by Gall, yet I still believe that we have to seek the foundation of dissimilar intellectual activities in a dissimilarity of bodily constitution, namely in differences of the brain cortex, and its cells, which are more or less developed, and re-act with celerity, or more sluggishly. Differences occur in this respect which indeed do not well permit of explanation in any other way. I myself easily retain numbers in my memory, and on recollection I see the number before me just as formerly I had it printed or written before me; on the other hand, the names of persons, even the names of friends vanish every moment from my memory, and even on recollection I must use exertion to retain them, or otherwise after a few moments I should have again forgotten them. The cause of this can lie only in the organisation of the brain, in a different quality of the cells, by whose help the necessary impressions, ideas, and images are excited. The apparatus for intellectual activity is not always equally perfectly developed in all its parts, and accordingly the talents also vary.

We know that our mind does not receive impressions direct from the outer world, that light, sound, and other impressions act only on the organs of sense, which transmit the received impressions to the perception-cells, that is to say, the centres where the nerves of sense arise or end; but to the mind that alone becomes known, which those perception-cells, by means of their different qualities, communicate. Through these cells, the impressions are communicated also to the brain cortex, where they become combined into images and ideas, or where they call forth an indistinct perception, a feeling, or an impulse. We must accordingly assume that the differences in our perceptions are occasioned by the different quality of the impressions which become communicated through the cells, always according to their specific nature. As each organ of sense has its peculiar perception cells through which we perceive light, sound, and so forth, so must also the cells of the brain cortex, with which the perception cells appear to be everywhere connected by medullary fibres, be endowed with different energies. They bring us a feeling, a perception through which our spirit may be set in a joyous or anxious key, but they create for us no image. The mind, however, can unite this perception with images, which it creates out of fancy.

Thus we acquire the ideas of form and of occupation of space through the senses of sight and touch; by the two the perceived points are united into a whole in the brain cortex, and are changed into an image. Through hearing we do not receive plastic delineations, as through sight, but only formless perceptions; but the single tones must again be united into an harmonious whole in the brain cortex, and that is rather a process of feeling which might well occur in the upper and hinder parts of the hemispheres. In smell and taste we feel only the agreeable and the disagreeable. For this we require only lower organs of sense, which are found in a less direct connection with the higher intelligence. Through them we learn to know, not the quality of the surrounding bodies, but only the way and mode in which the latter affect our bodies, and excite feelings. According to Gratiolet, they engender *sentiments*, in contrast to *sensations*. So also those cells, through whose excitation the perception of hunger and thirst is conveyed to us, will not be similar to those through which we recognise differences of temperature; for the perception of temperature is never communicated to us by the nerves of the intestines, which yet play so great a part in hunger. If we establish now cells with the specific peculiarity of calling forth the impressions of hunger and thirst, so no images can arise from these cells, but only obscure feelings, as through the cells of the back part of the hemispheres. They call forth an impulse, an inclination, a perception, through which the mind becomes affected in a specific way, and incited to action.

In my opinion, here lies the key to the explanation of that which we are accustomed to call instinct. There is manifested in animals a definite impulse corresponding in all individuals of the same species, by means of which they carry out isolated actions necessary for their own maintenance or for their posterity, wherein we must wonder at the excellence and adaptation to purpose, not to say the understanding and the genius. But as these actions are executed in an unconscious manner, and always in a nearly corresponding way, we cannot set them to the account of an understanding or a judgment, and we name them hereditary tendencies.

These animals find themselves in dependence on their bodies, or their nervous systems, that is to say, they possess specifically acting cells which communicate to their psychical principle a definite impression, by means of which the animal is impelled to this or that action. We have, indeed, also, different impulses; not only hunger and thirst, but also the sexual impulse and other inclinations, whose source certainly lies in the body itself. If eunuchs lose the sexual impulse, then those cells through which that impulse reaches to perception by the mind will no longer be efficient. I leave it undecided, however, whether they are entirely lost, or whether they still remain able to receive other impressions.

In animals, also, nerve cells may occur which are endowed with modes of action, whose analogue is not to be found in our bodies. Thus we observe many animals, for example, among birds of passage, who make their way without compass, thitherward and hitherward, peculiarities of the nature of which we have no conception. Similarly do we explain how the spider spins its web, how the bee forms its honeycomb, and the bird builds its nest.

From this explanation it becomes evident that, in our spiritual activities, an involuntary action of the body (the organic function of the brain cells included), and the voluntary action of the mind, meet together, act in and on one another, through which, complete thoughts and ideas are originated. The mind is the telegraphist, the body is the telegraph bureau. If the body expresses itself more strongly, that is to say, if the cells send very vivid impressions to the mind, then the involuntary easily assumes the upper hand; thus, in drunkenness, in delirium, in frenzy. If the mind remains master, then by means of its judgment it governs the combination of the different impressions; the images and delineations which it rules, become changed into ideas, and through the power of imagination it may achieve perhaps, a sculpture; through the awakened feeling, an adagio, or an elegy. Indeed, according to the tuning of the instrument, we resign ourselves more to intellectual operations or to impulses of the feelings. But if this mutual operation between body and mind already displays itself in quiet exercise of the judgment and disposition, it is manifested still more decidedly in the passions.

If any one experiences an offence through a mortifying expression or through any action of a third person, he is yet able, by strong will, to repress the consequences of this insult in the first moment, particularly if he early accustoms himself to self-government; he feels the insult, his nervous system is affected, but he remains calm and controls himself, although with a certain effort.

If, on the other hand, the thing strikes him quite unawares and unprepared, his highly excited mind re-acts energetically on the brain, and through it on the whole nervous system, and on account of the direct connection of the latter with the circulation and with the other functions of organic and animal life, the whole organism is set in tumultuous excitement, as the next consequences of which, violent palpitation of the heart and congestion towards the head occur.

On the last-named effects which are under the influence of the *sympathetic*, our will exercises no power; if the storm has once burst forth, it is nearly impossible to quiet it by the strength of the will. The brain cells which were already excited by the first insult, and the mental re-action on the brain, become now, through the secondary rising of the circulation, still more stirred up, the images and delineations chase one another through the mind, and the man put in a rage cannot quickly enough express by hot words the impressions received. The powers of the brain, strained by such a storm and by the accelerated circulation, re-act involuntarily on the mind, and impel it to unconsidered acts. Weak impressions no longer find an access, the raging man scarcely hears or sees anything, except the object of his fury; quiet reflection is to him impossible at the time. Carried away by the violence of passion, he can no longer master his ungovernable wrath. The consequences of the first insult, the excitement of the nervous and vascular systems by no means cease after removal of the exciting cause, just as the billows of the stormy sea do not become tranquil immediately on the cessation of the tempest.

The increased activity of the brain re-acts again on the whole organism, and thereby the close connection between body and mind becomes distinctly manifest. The insult befalling the brain next acts powerfully on the spinal marrow, and from this not only on the nervous system withdrawn from voluntary control, so that palpitation of the heart occurs, but also on the voluntary muscles, which are generally under the government of the brain and spinal marrow. Thus occur successive movements of the body. The man in a rage cannot stand still, he strikes out with his hands even against innocent objects, and stamps with his feet; the muscles of his face are in spasmodic contraction, his eye gleams and stares, at first nearly immovable, under the frowning eyebrows. These violent muscular actions or movements of the body increase on their part the frequency and energy of the pulse, and that again acts secondarily on the already-excited energy of the brain. An abatement can only occur when the involuntary reaction of the organism is brought into quietude. On that is founded the advice to give a chair to the angry man and invite him to sit down. If this succeeds, the rapidity and energy of the circulation which were kept up by the bodily movements are lessened, the body becomes quiet, the boisterous ruling of the brain abates, the rational and tranquil disposition returns to the mind, and it again governs its empire.

From this it is clear, how much depends on not allowing to a raging maniac full freedom of motion, as many physicians desire, namely, the advocates of the *no-restraint* system. Such an unfortunate person must, according to their view, vent his rage; on that account his movements are not to be impeded, but they are only to be made as far as possible innocuous; this necessarily requires confinement in a secure cell. I have not been able to assent to this doctrine. I have always seen a good result follow, when a maniac has been placed in a suitable confining chair. I have introduced one such into all the Netherlands establishments; it is convenient for the patient, withdraws him from all points of support, and saves the trouble of keeping him back by strong ligatures, and bringing him into a cell. As the body rests in a comfortable posture, the circulation becomes calm, the internal remedies for moderating the cerebral irritation act quicker and more effectually, and the attack is considerably shortened. On that account one only seldom meets a violent maniac in the Utrecht establishment, because by these means the storm is nearly always successfully hushed up.

SECTION 13.—*Influence of the Body on the Mind.*

After that the peculiar and specific functions of the different ganglion cells, especially in the brain cortex, as well as their connection and interchange of action with the mind, have been discussed, it must appear desirable to inquire into the somatic causes by which these cells may become excited and set in increased activity, and which thus exercise so important an influence on our mental powers.

Among these causative forces, in any case the first place must be conceded to the blood. Its more or less decided arterial condition, the possible admixture of foreign substances, the rapidity of its movement, the filling of the vessels of the brain,—these are all so many important points.

No part of our body is able to exercise its activity, if arterial blood does not reach it, and we may therefore well distinguish this as the life fluid. But it is admitted that no other part is so sensitive to the slightest modification of the condition of the blood, as the nervous system, especially the brain. In the lungs and in the liver venous blood in large quantity is normally found, and it may, without injury, accumulate copiously in them; but the presence of venous blood in the arteries of the brain, can, within a few minutes, lead to a fatal stasis, which was shown in an unanswerable manner by the experiments of Bichat (*Sur la Vie et la Mort*, 4th edit.: Paris, 1822, p. 360), which must always remain as a pattern of physiological experiments. The peculiar disposition of the fœtal circulation also speaks in favour of this, where the more arterial blood streams especially to the brain and spinal marrow, and the body generally receives pure arterial blood only after the beginning of pulmonary respiration.

It stands again in connection with this, that the grey substance of the brain in general, but especially the brain cortex is so rich in capillaries, especially when we compare the capillary richness of the medullary substance with it. (E. H. Ekker, *Onderzoekingen over het haarvatenstelsel van hersenen en ruggemerg* in *Nederl. Lanc.*, 1852, p. 329.)

From this rich supply of arterial blood to the brain cortex, we may draw the conclusion, that the cells of the cortex stand in active interchange with it, added to which it is also to be observed that the arteries entering the grey layer from the pia mater, have a very short course, and for the most part do not reach even to the deeper medullary substance; the consequence of this arrangement must be a rapid renewal of the blood. But these parts of the brain are also very sensitive if only any portion of foreign matter is mixed with the blood. In a room filled with people, in the air of which the chemist can discover scarcely any difference in the proportional composition, and whose greater content of carbonic acid with purity in other respects would have no injurious influence, we see, especially in sensitive women, faintings, spasms, and other phenomena occur, and for this reason, that in expired air, animal matters injurious to the organism are contained, which are breathed again and mingle with the blood. I will further only refer to the effects of small quantities of chloroform vapour, or the rapidly fatal effects of inhalation of concentrated hydrocyanic acid, or also to the injurious scent of many flowers which readily induce headache and other brain symptoms. What minute quantities are here in play, which even after becoming mixed with the greater part of the blood, can in such dilution act upon the brain.

As the indications of activity (*Lebensäusserungen*) of the brain cortex are dependent on the action of arterial blood, it is also explained why, through more copious supply of blood, a general excitement and increase of the brain powers acting there are called forth. It is not a question of particular impressions or perceptions, but through the increased change of matter and the excitement of the cells of the cortical substance of the brain, the delineations and images which present themselves to the mind become more vivid, and the answers occur more quickly to the questions proposed by the mind; that is to say the speech is quicker, the thoughts are developed easily and rapidly, and one needs not to think long for a word or simile for his conversation. In such excitement of the brain cortex, all takes a rapid course, the whole body shares, and the speaker finds no end. Even through a rapid supply of arterial blood of only short duration, the brain cortex becomes affected. I have already said, that any one who has been running fast and arrives out of breath, cannot at once answer profound questions, which require a quiet thinking over. We see the same thing, when the circulation is excited through other stimulants, for example, by wine, but there is here in addition also the direct stimulation by alcohol. The mind is rapidly awakened, the fancy is more lively, great and exalted images appear, and the verses of the poet flow. But if the circulation increases, then soon the involuntary obtains the upper hand of the mind, the images and delineations follow one another more rapidly and without order, so that the understanding cannot comprehend them, the mind cannot govern them, language and train of thought lose their connection and regularity, and on the slightest occasion the most violent passions may burst forth.

We see the like in fever. At first, when the pulse becomes quicker, the patient appears unquiet, so that he cannot lie still. Then, if the irritation of the brain increases, the images and delineations become so vivid, that he is no longer able to distinguish them from real images, and he is delirious. Here also we have to do only with more excited action of the cells of the brain cortex.

From the peculiar course of the arteries in the brain, the accelerated circulation, especially in the brain cortex, becomes intelligible. The carotis cerebralis immediately after its entrance into the skull cavity, divides into several large branches. As a continuation of the trunk we have the art. fossæ sylvii, which spreads out in the pia mater on the convolutions, and especially on those of the anterior lobes of the brain; from it the brain cortex receives the first impulse. The deeper vessels, *e.g.*, those for the corpora striata, do not arise from the trunk of the vessel itself, but are small branches from the ramus communicans Willisii. Now as the principal branch, after manifold divisions, spreads out in the pia mater in the brain cortex, a stronger pressure of blood tells first upon this. Therefore, persons who suffer from active hypertrophy of the heart with enlargement of the carotids, and in whom more blood flows to the brain, are for the most part more excitable, and come easily into ebullition. Friedreich also relates an observation of Parry, who, by means of pressure on the carotids of an insane patient, was able to moderate and repress the maniacal fit.

Here also belongs the observation that rachitic children have generally large heads, and possess quick perceptive faculties, as in them, according to the testimony of Haller (*Elementa phys.*, iv., p. 402), the blood vessels of the head are distinguished for their greater calibre.

It is a known fact, that deformed hunchbacked individuals, in whom the blood flows more quickly and strongly towards the brain, are remarkable for vivacity of spirit. Persons with long necks are mostly quieter and slower, those with short necks more lively, more restless and impetuous; but in this again there are exceptions.

Here belongs also the influence of air and climate on the life of the brain. Mountaineers, who breathe a purer air, are more lively, quick, and courageous, and in those dwelling in a damp misty air, one meets much oftener a sluggish and apathetic temperament. This different effect on the mind we experience even in our own selves.

With this also corresponds the observation that suicide so frequently occurs in the foggy period of the year, because then the depression of the spirits is still further increased. Villeneuve reports that of ten suicides which occurred in a quarter of the city of Paris within two years, nine happened in rainy and misty weather.

Conversely, a not-sufficiently-arterialised blood depresses and stupifies; relaxation and drowsiness arise from it. Asthmatics are in general timid and faint-hearted, but, on the contrary, bodily and mental strength usually correspond with a broad roomy chest. Scorbutic and chlorotic patients, who have a watery blood, are for the most part peevish and pusillanimous (*Burdach, Bau des Gehirns*, iii., s. 115); and in jaundice, where the blood is saturated with foreign admixture, mental depression, moroseness, and melancholy, are always combined. If venous congestion is present, the movement of the blood is sluggish, and accumulates in the head, as so frequently in plethora abdominalis; where venous congestion of the head is brought about by reflex action, we observe generally a tone of depression, inclination to melancholy, and feeling of anxiety. If the backward flow of blood out of the brain experiences any impediments, as, for example, in pericarditis, where also the supply of blood is weakened, then the feeling of anxiety often reaches an indescribably high degree. A depressed disposition and a feeling of anxiousness after bodily movements are observed also in those who, in consequence of malformation of the heart, suffer from morbus cœrulens. As the cortical substance with its cells, requires the continual gliding through it of an arterial blood, while by impeded outflow and venous congestion, the blood streams through more slowly, and consequent also on the weak excitement from arterial blood, the change of matter is diminished, the peculiar anxious feeling which occurs in asthma, and plays an important part in many melancholic patients, is thus well explained.

In all these cases the reason of the changing mental humour, is to be sought in an unequal excitement of the cells of the brain cortex, in which these are set by different kinds of blood irritants.

The influence of the body on the mind is not, however, limited to the direct action of the blood on the cells of the cortex of the brain; even distant parts, and especially the sympathicus, interfere therewith. It is known that the sympathetic accompanies the vessels of the interior of the skull, and its influence upon these vessels has been rendered distinctly apparent by some experiments which were carried out at my wish by Professor Donders and Dr. Callenfels (*Over den invloed der vaatzenuwen op den bloedsomloop*, etc.: Utrecht, 1855, p. 67). I observed in these experiments, that on irritation of the sympathetic and its cervical ganglion, immediately a narrowing of the vessels in the pia mater occurred, which, however, was soon followed by a decided enlargement, so that the vessels were two or three times thicker than during the preceding irritation, but only on that side corresponding to the irritation. After the ganglion had been excised, an irritant was applied to the sympathetic of the other side, and now in the other hemisphere there was first a narrowing, which was followed by enlargement.

Brachet (*Recherches expérimentales sur le système ganglionaire*: Par., 1830, p. 368) had previously found, that when he divided the superior cervical ganglion in a dog, the brain on the operated side was more strongly injected, and somnolency occurred. Callenfels, who experimented on rabbits, could not confirm these statements. We must, however, remember that, in the dog, the sympathetic and vagus are closely associated with one another, and thus indeed the vagus was also divided, through which the breathing must have been impeded, and consequently a soporific state might arise.

An analogous observation I find recorded out of the experience of Roux (Schmidt's *Jahrb.*, 1856, No. 7, s. 19). Roux operated on a coachman for a large carcinomatous tumor of the neck; the right carotid had to be tied twice, and the vagus together with the cervical portion of the sympathetic was divided! The voice became hoarse, and attacks of coughing appeared. On the section the convexity of the right hemisphere, thus of the operated side, was seen more vascular than the left. But that is quite in accordance with our knowledge of the vaso-motor nerves. If these are paralysed, the vessels concerned become enlarged, and in this respect the vessels of the brain form no exception.

It is more difficult to establish how more remote organs, for example, the viscera of the abdomen, can act on the brain by means of the sympathetic. But we prove this influence quite vividly after every indigestion. Even after each meal we are less disposed for mental exercise. If digestion is really impaired, if the appetite fails, then we feel indolent, unstrung, and depressed; this occurs in a still higher degree with constipated bowels and so-called obstruction, at the ground of which, as I shall afterwards show, strictures of the large intestine lie. The spirit is then quite broken down, a more or less severe feeling of anxiousness occurs, for which the patients are not able to give any reason, and by which they as a rule will be prompted to sundry accusations against themselves.

In explaining this relation, I will first attempt the opposite way, and seek to ascertain how a depressed state of spirit may act on the body.

It is known that in sorrowfulness and mental suffering we have a feeling of languor and depression, the movements follow with heaviness and tediously, we have a weight in the limbs, the digestion suffers, the pulse is slow, but at intervals we seek to obtain some relief by sighing and deep inspiration. The blood flows less easily through the lungs. To this is added a peculiar feeling of depression at the pit of the stomach, which is especially strongly marked in qualms of conscience, and rises to agony. With the sluggish circulation, the blood in the brain is not duly renewed, and the brain is not stimulated in the necessary manner by the slow restitution of arterial blood; this has been already ascertained by Nasse (*Untersuchungen zur Physiologie und Pathologie*, 1, s. 348).

While from other causes which act on the pelvic nerves similar attacks come on of a feeling of pressure in the præcordia with some spasmodic constriction of the stomach, or still more of the colon, with which secondary derangements of the circulation are combined, so that the hands and feet are cold, but the head, and especially the top of it, appears hot; then there also occurs a feeling of anxiety and depression as in affliction, pain, and stinging conscience. In such a case the external cause only is wanting. Such a patient will, according to his disposition, seek to explain the matter in various ways, but he mostly runs into attacks on his emotional life, and self-reproaches. Therewith occurs, however, the very essential difference, that every one who is depressed through a misfortune, or any other external causes, allows himself to be comforted and cheered, but here these means do not take effect, since the material causes which bring on the tormenting anguish and disquietude cannot be removed by arguments of reason; a circumstance which is generally too little regarded.

As thus sorrowfulness and grief act on the intestines, and call forth in these pecular disturbances; so, again, analogous affections of the intestines and of the sympathetic, cause in a reflex manner, a gloomy ill-defined feeling of depression in the brain, breaking down of the spirit, melancholy.

However, the pathological affection of the sympathetic does not always lead to melancholy; vivid impressions, phantasms, and hallucinations may also arise from this source. An interesting proof of this we owe to the celebrated Larrey. A soldier had been shot in the abdomen, and had on the right side a fistulous opening, which commenced two fingers' breadth from the most prominent part of the false ribs, and ran obliquely inwards and to the left. A probe in the fistula took a direction towards the transverse colon and the anterior surface of the stomach, and the touching of these deep parts with the probe immediately called forth unusual nervous symptoms. First there occurred a sensation of cold and of oppressive pain; then followed a spasmodic contraction of the whole abdomen, and a stretching of the limbs; after this the man fell into a confused chattering, into a kind of somnambulism, and this stage one could lengthen at will if one entered into his arguments; after twenty-five or thirty minutes these incidents at last ceased, and the patient assumed again a kind of home sickness and an hypochondriacal humour which had taken possession of him without intermission since he had been wounded.

Larrey thinks that the ball, probably enveloped in a portion of the shirt, had experienced a strong resistance from the abdominal wall, had then passed through the thin layers of the omentum, and struck the underlying transverse colon with violence, so that its inner vascular layer was torn; for immediately after the first occurrence of inflammation, a severe bleeding from the intestine took place. In addition, the ball had occasioned a concussion of the cœliac ganglion, to hyperæsthesia of which, Larry correctly refers the hypochondriasis and the other nervous phenomena. The direct influence of the sympathetic on the occurrence of the brain symptoms, is, in this case, distinct enough.

The operation of the sympathetic, derived from the colon, which, as I shall show further on, exhibits a peculiar tendency to reflex action on the brain, I have on one occasion had an opportunity of perceiving in myself. In consequence of a powerful mental exertion, and fatiguing work, with the addition of a cold, I was attacked with a remittent fever, after, quite contrary to my habit, I had previously suffered for some days from constipated bowels, with a feeling of fulness of the abdomen. My physician feared the development of a nervous fever, and on that account was opposed to the employment of mild purgatives and clysters, which I wished to receive. After two days' duration of the fever, hallucinations and phantasms appeared to me; on shutting my eyes I always saw a number of people around me, and at the same time I had complete consciousness, as I was convinced it was only hallucination. Three days and three nights these appearances continued with increasing intensity. In sleep I dreamed constantly, and after awaking, I only needed to close my eyes in order to see the people, who continually changed. At last I had a clyster, through which a large mass of highly fœtid matter was evacuated, and in a moment all the appearances vanished, so that I felt myself restored. The next morning the scene was repeated, although in a slighter degree; after a second evacuation of similarly constituted masses, all the appearances again instantaneously vanished—I felt quite well, and remained so.* The change appeared so suddenly and so completely, that I believe myself to be quite correct in assuming a direct action of the noxious masses on the irritated nerves of the colon, and through them on the brain, which, in consequence of the previous exertions, and under the influence of the fever, was in a state of greater excitability. As I, immediately after the removal of the fœcal masses, had a feeling of recovery, and felt myself quite another man, it cannot well be supposed that a congestion of the brain caused by increased temperature thus ceased in a moment, so it might appear justifiable, if I ascribe to the sympathetic, together with its effect on the cerebral circulation, also an influence on the brain through reflection.

I will seek to illustrate this important subject further through some other cases. If in my case the cerebral irritation, which in all probability affected chiefly the anterior lobes of the brain, manifested itself in the form of hallucinations, so may the same sympathetic action in another disposition express itself in the form of melancholy, as soon as the upper and hinder lobes are mainly attacked. More than once I have observed that after the evacuation of hard putrefying, or also jelly-like fœtid masses, a perfect riddance of the melancholy rapidly occurred. I pick out the following cases.

A scientific cultivated man, after a severe nervous fever, had too soon occupied himself with fatiguing work, and, through a sedentary life, he fell into a deep melancholy, which for two years defied medical treatment. He was not able to direct his thoughts to other objects, and had lost his memory; his physician therefore considered his malady incurable. As the man spoke quite sensibly on all other things, I had still some hope that we might only have to do with a sympathetic affection of the brain, without at present any degeneration. He went to Pyrmont, drank the water there—a strong saline—at that time a spring very little known, and in a short time he perfectly recovered. After his return he told me that after drinking the water for a few days, and daily riding on horseback, he had felt a severe pain in the left side, with impulse to stool, but the stool was so painful as to make him shriek out. Therewith he evacuated masses much hardened. Immediately his melancholy vanished completely, he felt himself quite another man, and was again quite animated and interested. Later again, on entering on a professorship, he performed the duties of it quite unclogged, and without suffering in the head; indeed, even easier than formerly. His mind had not suffered through this depression of intellectual activity of more than two years' duration. Eight years have since elapsed, and he enjoys continuously undisturbed health, only he is perhaps occasionally too lively and excited.

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* In this point of view the following is also remarkable:—On account of the feverish heat, I used cold applications to the head, and these had immediately the effect of making the surrounding persons and their clothes pale, their movements also became slower; for there played about me the image of a landscape, filled with a number of men, and at last I believed that I saw around me only dull grey and white statues. As I had full consciousness, I repeated this observation many times with the same result. With the cessation of the cold applications, the movement and colours of the images again returned. I even altered the experiment a few times by making the application only on the right, or on the left side of the head: then only the figures on the side corresponding to the cold application became pale, and the other half of the group of images retained the former liveliness. After many years, the circumstance is still vivid in my recollection; for, on account of its curiosity, I had immediately after my recovery written it down with many particulars.

How the nerves from the uterus may act, we see quite plainly in hysteria. Among others a very decided case of the kind occurred to me in a delicate sensitive woman whom I had before her marriage once treated for melancholy with good result. A few years after her marriage, she again fell into a melancholy state, combined with a feeling of great weight in the pelvis, for which leeches to the labia, resolvents, and other means were fruitlessly employed. On the occurrence of menstruation, and during its continuance, as very frequently happens, the melancholic tone became always more decided. On examination, there was found prolapsus uteri, hypertrophy of the uterus itself, with great sensibility of the os uteri; the woman complained of a feeling of pressure, which ascended from below upwards, and caused her indescribable anguish. The reposition of the uterus was rather difficult; but as soon as it was accomplished the melancholy vanished immediately. The prolapsus occurred yet several times afterwards, on which occasions the feeling of anguish and the melancholic tendency always reappeared, so that the woman could not bear the look of the man with whom she lived quite happily, and every time these appearances vanished immediately after successful reposition. After complete recovery from the prolapsus, the lady remained quite healthy, and I have known her so for several years.

From such cases one perceives distinctly that distant parts can exercise a sympathetic influence on the brain, and one must assume that the sympathetic acts at once by reflexion on the brain, by which means mostly peculiar gloomy feelings are awakened. As no plastic delineations accompany these, so will this reflexion manifest itself, in most cases, rather in the upper and hinder lobes of the brain, where, in such melancholic frames of mind, I have always found marked hyperæmia of the brain cortex, and stronger adhesion of this to the pia mater. This reflex effect generally leads to a rather passive congestion. Yet, if no organic degeneration has occurred in the brain, the change in such cases follows so quickly, the melancholic and previous reflex appearances draw back so suddenly, that I can scarcely well imagine a passive congestion, with its consequences, could so quickly pass away. I will not, indeed, assume that, in such cases, no passive congestion occurred, as product of abnormal action of the sympathetic, but the congestion alone did not cause so decided a melancholic condition. The direct action of the sympathetic on some parts of the brain, appears on that account very probable. Combined therewith is a more or less increased sensibility of the medulla oblongata, which displays itself as so-called spinal irritation; pressure on the first and second cervical vertebræ cannot be borne, for it causes a peculiar disagreeable feeling in the head, especially in the vertex. As a rule, the pupils also are dilated from such reflex action of the sympathetic.

The passive congestions, which for the most part occur suddenly in the upper and hinder lobes of the brain, appear to me to be a consequence of reflex action of the sympathetic rather than a primary cause of the melancholy. Doubtless they can of themselves make the disease worse and even incurable.

If these congestions have extended over the whole brain, then yet other phenomena occur; confusion of the current of thought, sparks before the eyes, and so forth. In pure melancholy however, these seldom occur, but almost exclusively in the passive chronic affection alone.

Such sympathetic brain affections arise most frequently in the colon, especially in the left side of the colon, but also in the uterus, similarly in men in the generative parts. I have observed them a few times in men who suffered from severe catarrh of the bladder. They may also stand in connection with lung affections; this effect on the brain less frequently arises in the liver than we might have supposed.

In this reflexion from the sympathetic to the brain, we must remember, that the impression produced in the brain differs entirely from those impressions which we receive through the organs of sense. Through the senses we receive definite impressions and delineations, so that we are immediately clear as to the inducing causes. On the contrary through the reflex action of the sympathetic, we do not receive direct delineations, but there occurs only a heterogeneous unpleasant perception, as to whose source the mind remains in the dark, and as generally no pain is combined with it, the patient seeks the ground of his suffering outside of the body. Through the uncertainty respecting the nature and origin of these disagreeable sensations, the patient is worried with anguish and fear, these again themselves react on the brain, excite in it all sorts of strange thoughts, and may even lead to desperation.

SECTION 14.—*General Pathology of the Brain.*

Before I turn to therapeutics, I think it convenient to premise some general observations on the nature of the brain, and its pathological alterations.

The different parts of the body are distinguished from one another in their texture and in their functions, and these differences assert themselves also in the sick, so that the physician should not be regardless of them. Many parts of the body are distinguished not merely by their vascular richness, but also by a highly increased irritability, so that even weak influences may call forth a severe inflammation; such for example is the case with the lungs. The stomach is also certainly very rich in vessels and nerves, but it bears without injury strong impressions, which would in other parts immediately excite a severe inflammation, and hot spices and other substances leave it uninjured. The peritoneum on the other hand, although it is only sparingly endowed with vessels and nerves, may rapidly inflame through mere irritation of the atmosphere.

The brain, notwithstanding all its importance, does not rank exactly high in this respect; for although weak irritants are in a condition to act upon it, yet a state of inflammation is not very quickly induced. Severe acute inflammations of the brain occur indeed, to which the excitable organism of the child is especially disposed, and in the riper years of life, the male sex has a greater tendency thereto than the female, on which account in men irritation of the brain generally sooner leads to degenerations. But it is remarkable how the brain, especially in women, may be excited and irritated without inducing inflammation; when it occurs, it generally first affects the cerebral membranes, and assumes rather a chronic course. In the brain substance itself, a primary inflammation more rarely happens, and then it is mostly only local. Even in patients with mental diseases, we find more frequently affections of the membranes with alterations of the cortical substance than affections of the brain substance itself, where the consequences mostly display themselves only after a longer course, either as softening or as induration. Thus has it happened that we have not felt satisfied by the sections of bodies, and that we could not suppose so important phenomena to have been caused by such slight alterations, and thereupon we fell into the belief that insanity must be regarded as a purely psychical lesion.

We came still more into difficulty through the pathological anatomy of the brain, inasmuch as in dead bodies we sometimes met with important degenerations of the brain, and collections of pus, which during life had not betrayed themselves by any symptoms. While the inflammation of the brain substance remains for the most part locally circumscribed, no manifestations of insanity arise therefrom; it must then extend to the pia mater, or reach from its point of origin to the anterior and upper part of the brain. Even portions of the brain may be lost, and the sufferer recover with complete preservation of his intellectual faculties, if only the wounding has not been followed by meningitis extending over the brain, and if the cortical layer of the anterior and upper part of the brain has remained sound and capable of function.

In illustration and confirmation of this, I will communicate some observations.

A heavy beam fell on the head of a carpenter, so that he was struck down unconscious, and on examination a considerable fissure and depression were found on the top of the skull. After some time, the appearances of pressure on the brain demanded the operation of trephining, by which a quantity of pus was evacuated from the interior of the skull. After this the man's head was free, and he was perfectly conscious. No delirium had existed, but dulness and coma before the operation. As the man afterwards asserted, he heard a loud noise during the operation. He now found himself quite well, and daily went to his work without complaining of anything. A quarter of a year after the operation, he suddenly fell down dead while at his work. On section there was found under the right coronal suture an abscess of about two centimetres deep,* and two and half centimetres wide, which reached to the right lateral ventricle, but did not communicate with it directly. The walls of the sac were about five millimetres thick, and consisted of long cells and young connective tissue. On the inner surface of the ventricles the ependyma was inflamed, probably in consequence of the enlargement and further extension of the sac of the abscess, and suppuration had occurred, so that a thin, rather serous pus had passed through from the third to the fourth ventricle, where probably, by suddenly induced pressure, the catastrophe had been brought about. On the surface of the brain there was no trace of inflammation, the cortical layer was quite healthy, and the membranes also were quite free from inflammation. Thus is it explained why, notwithstanding the important suppurative destruction, the man remained in full possession of his intellectual powers up to the moment of his death.

Still earlier I made another interesting observation on an old man seventy-two years of age. Hitherto always quite healthy, so far as he could remember, he felt without any known cause an unpleasant sensation of itching and formication in the left hand and foot, together with deafness, and thereupon complete paralysis of the left arm and leg was rapidly developed, so that after fourteen days, he could no longer move the limbs. Now occurred contractions in the flexor muscles of the paralysed side, which were interrupted by tremblings and involuntary movements. After four weeks the man could not move the neck nor turn the head. But the muscles of the face still retained their mobility and the pupils were not dilated. Sensation remained in the limbs. Sixteen days after the beginning of the disease, voluntary control over the rectum and bladder was lost, although there was a quite regular daily evacuation. The appetite continued always good. The pulse was constantly rather accelerated, full, and often nearly hard. Bed sores soon formed, especially on the paralysed side. In the last few days, swelling and pain of the left arm came on, likewise ulceration of the elbow, and the whole arm assumed a bluish appearance, although the pulse was still unaltered. Derivative measures to the neck, and Flores Arnicæ produced no improvement. Up to his last breath, the patient retained perfect consciousness; he had no trace of headache, no dulness, no heaviness in the head, nor any other unnatural sensation in it. He repeatedly assured me, and especially only a few hours before his death, six weeks after the outbreak of the disease, when I questioned him impressively about it, that he had never before his illness suffered from headaches, and also during the whole illness he had had no headache, not even noises in the ears. Any one seeing the old man, with his cheeks a little coloured, as he talked so intelligently, could have scarcely considered him to be ill; for he complained only of pains in the left arm, and of inability and paralysis of the left side.

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* Nearly an inch.

The section displayed first that the small intestine had coiled round the descending colon in a remarkable manner; the sigmoid flexure was narrowed, but the part of the colon above was distended with gas; through this the colon had pressed between the liver and diaphragm, so that the surface of the liver presented depressions for the distended intestine. It is thus evident, that this dilatation must have existed for some length of time, and yet the man had not suffered from sluggishness of the bowels, at least during his six weeks illness. The heart and lungs were healthy, the vertebral canal was now opened, as I am always accustomed to do it, from before; it was then seen that all the vertebra were anchylosed together by bony masses. The sac of the dura mater was tensely stretched and filled with a reddish serum. The cervical portion of the spinal marrow showed increased firmness, especially anteriorly in the region of the fourth cervical vertebra; the pia mater here was of a greyish colour, and the arachnoid was adherent to the pia mater by false membranes, moreover in several places, there were cartilaginous and even bony lamellæ in the arachnoid.

The dura mater of the brain was so firmly adherent to the skull, that the latter could not be separated from it, and the dura mater had to be divided circularly. In the right hemisphere there were traces of a past arachnoiditis. In the anterior lobe of the right side, about one and a half centimetre distant from the falx cerebri, where Foville's convolutions of the fourth order are situated, there was a distinct softening of the brain with sharply circumscribed border. This softening, which affected in an equal degree the grey and the medullary substance commenced in front above the roof of the orbit, extended to the gyrus parietalis anterior, and further towards the falx, even to the gyrus parietalis medianus; thus reaching three centimetres deep, even to the corpus striatum. Its greatest breadth beneath the frontal bone amounted to 2½ centimetres. In all this extent the pia mater was firmly adherent to the brain, and could not be separated without tearing; indeed, in the anterior lobe, the softened brain mass, even to the corpus striatum, remained attached to the pia mater, as may still be seen in the preparation in my collection. Everywhere else there was nothing abnormal, neither in the brain nor in the pia mater, and the latter could in all other parts be easily separated. The left hemisphere was quite normal. In the ventricles the ordinary small quantity of serum was found. In the corpora striata, in the thalami, in the corpus callosum, in the pons, and in the cerebellum, there was nothing abnormal; only the medulla oblongata appeared to be somewhat firmer. Except in the pathologically altered spot, the grey substance was nowhere strongly coloured; there was, also, no hyperæmia of the brain or spinal cord. It was, accordingly, a case of local circumscribed softening and degeneration, which appeared to have proceeded out of the depth and from the side of the corpus striatum, from the so-called radiating fibres, and extended to the surface where it gave rise to a locally limited meningitis.

Now, in this case, the greater part of the anterior lobe of the brain, which I still regard as the organ of the higher mental powers, was on the right side degenerated and destroyed, yet the man had not suffered from loss of intellect, nor had he complained of any abnormal sensation in the head. This appears strange at first, but is quite in accordance with what was before adduced respecting the functions of different parts of the brain. It has long been known that the hemispheres of the great brain are not sensitive, and that portions of them may be taken away, without the patient, even when fully conscious, being aware of it. The insensibility arises from this, that the different perceptions and impressions which we receive, proceed from cells with different sensitive energy, whose activity becomes excited through external impressions and is then perceived by us. Accordingly, if the cells in the hemispheres and in the cortex of the brain, are not capable of awakening in us sensations or pains, for which the perception cells found at the base of the brain are destined, so neither can affections of the hemispheres themselves give rise to pain; that is to say, the hemispheres are not sensitive. The cells of the cortex of the brain re-act certainly on stimulants, but the induced perceptions are not manifested as feelings of pain, but in the form of ideas or pictures, of inclinations, of dispositions, of humours, according to the different locality of those cells.

If there occurs a merely local affection as in the two cases related, where degenerations had commenced, then of course the degenerated parts can act no more, and can supply us with no perceptions, which could only manifest themselves in stronger intensity of delineations, of images, of dreams. But from the remaining parts of the brain no pathological manifestations could proceed as they were not affected, for the meningitis did not extend further over the brain.

We may fairly conclude from these cases, that the brain possesses only slight irritability, as so important local degeneration may be present without the surrounding parts becoming affected by it. Such, however, occurs only in adults. In a child, such a destruction would not have remained entirely local; beyond doubt a general meningitis would have arisen here.

In the second case, the local mischief must have extended from the depths of the brain mass to the convolutions, so that at last the pia mater became affected and inflamed, but also quite locally. It is otherwise when the disease proceeds from the surface of the brain cortex, and from the pia mater itself, as, for example, in cases of mania. Then it extends more or less quickly over the whole surface, or, at least, over the greater part of the hemispheres. The pia mater and arachnoid have, in common with the serous membranes, the peculiarity that an inflammation arising in them extends over the whole surface. But whether intellectual disturbance occurs therewith or not, depends on whether or not the subjacent brain cortex is drawn into the inflammatory process. This relation is not sufficiently regarded by physicians.

A slight congestive state, or a commencing inflammation of the pia mater, may be limited to its outer layer together with the arachnoid; a plastic exudation is then formed underneath the arachnoid, which often, in the form of a more or less opaque fatty membrane, covers the whole brain. This occurs frequently in the insane, and I formerly supposed that in this we might find a distinctive sign between the brain of an insane person and of another who has died of a disease unattended by intellectual disturbance. On more accurate investigation, I was soon convinced that this so-called fatty layer, this whitish exudation between the pia mater and arachnoid, may also be found in the bodies of sane patients, and of those who have never complained of headache. This is confirmed also by Nasse, who relates an interesting case where a narrowing of the small intestines, and at the same time a strong fatty membrane *(eine starke Speckhaut)* extending over the whole brain were found; but yet, even up to the failing of the pulse, and the limbs becoming cold, no trace of delirium, of insanity, or of failing consciousness appeared. On that account, Nasse rejects the ingenious but one-sided theory of Bayle, who would refer insanity in every case to meningitis.

More than thirty years ago I proved (*Observationes anatomico-pathologicæ*, 1826, p. 28), that contiguous parts which possess different tissues, are not easily affected with inflammation in similar degree. Thus, for example, the intercostal muscles, are nearly always quite unaffected in costal pleuritis, and also in peritonitis the muscular structure of the intestine is only rarely attacked. So it is with the pia mater. Congestion, inflammation, exudation, may be limited to its outer surface, and may leave the brain free, so that in the dead body we find an exudation included between the arachnoid and pia mater, whilst during life not the slightest pathological brain symptoms had been observed.

I must here refer to what I have previously asserted respecting the vessels of the pia mater, namely, that in the pia mater itself a direct transition of arterial blood into the veins occurs, through which a stronger streaming of blood, indeed even a congestion or a slight inflammation may happen, without the vessels which reach into the brain cortex taking part therein; as we might say the storm passes over us, without our observing it. From the slight irritability of the brain, an inflammation is only propagated to it slowly, and then generally takes a chronic course. If, therefore, the muscular tissue of the heart, in spite of a violent pericarditis and exudation into the pericardium can remain healthy, we may be justified in the assumption, that in inflammation and exudation on the outer surface of the pia mater, the process does not necessarily reach the cortex of the brain. Now, as the hemispheres are insensitive, yet as an irritation of the cortex of the brain can give occasion to excitement and violence, but not to headache, so the slighter affections have no special pathological symptoms as their consequence, so long as the mind still holds the rein. If this loses its mastery, then is the brain cortex already more powerfully affected.

Without ground have Nasse and others on psychological views wished to strike out meningitis as a cause of insanity and its sequences, because meningitis with exudation may also occur without brain symptoms. Here all depends upon the extent of the inflammation, whether this is limited to the outer side of the pia mater or whether the cortical layer is also drawn into the process; for in both cases the exudation between the pia mater and arachnoid is quite the same.

But local destructions occur not only in the frontal and vertical regions, but also in the inferior or temporal lobes. I have sometimes seen collections of matter at the top of these lobes without brain symptoms or pain having occurred. Pain, but then very severe pain, comes on only when the dura mater participates in the inflammation.

If the inflammation of the brain substance is quite local, when for example it happens from stasis, or when, as was probably the case with the old man of seventy-two years, it is developed out of the depths of the brain, then the manifestations of brain affection are wanting. If the inflammatory process is limited to the external surface of the pia mater, then may excitement and sleeplessness appear, often also a feeling of lightness or of heaviness and fullness; or there may be a sensation of a foreign body moving to and fro in the skull, which probably proceeds from a distended vessel, or from the fluid between the pia mater and arachnoid being set in motion. If the brain cortex is more strongly irritated, then in acute cases delirium occurs, in chronic cases, on the other hand, mania or melancholy with their consequences. In insanity, especially if it is idiopathic, one only seldom hears the complaint of headache.

If now the hemispheres possess only a slight irritability—if they are equally insensitive in the sense that their affection does not display itself by pain—so long as it does not act directly or secondarily on the deeper parts of the brain, nor extend to the dura mater—yet are they distinguished by a high degree of sensibility, in that even a weak irritation may call forth violent symptoms, although no inflammation, or only a very slight trace, be present. A tubercle, a moderate extravasation of blood, may occasion the most violent convulsions; irritations of the cortical substance or strong congestions, such as occur in delirium tremens, produce attacks of fury; loss of blood, in which surely there can be no congestion or inflammation, causes the most violent spasms, because the relations of the blood to the cells and fluid of the parenchyma has sustained an alteration, through which the equilibrium between the cell contents and the surrounding fluid became disturbed, and consequently an alteration took place in the action of the cells. The motor cells in the corpora striata appear yet more subject to such a change,as in fatal hæmorrhages, convulsions and loss of consciousness occur, but no attacks of madness. Insignificant idiopathic or sympathetic causes—for example, worms in children, or hysteria in girls—may induce very violent symptoms; and on the other hand, very important lesions, for example, local suppurations, may exist for a long time without our being aware of their presence. Violent symptoms do not then at all justify the assumption of a severe inflammation such as must be actively treated by bleeding and antiphlogistic measures.

If also the brain is so far sensitive, that a weak irritation can call forth violent symptoms, yet it does not belong to the irritable organs in the sense that a violent inflammation may be quickly developed in it. In the morbid processes of which I am here treating, the inflammation is far more inclined to a chronic course, and on this account we cannot act so quickly on it by a free bleeding, as is often the case in pleurisy or pneumonia.

The weak action of the vascular system in mental diseases is also to be undersood from this, that even when violent symptoms occur, nevertheless no fever is present. However, if an active acute encephalitis comes on, then it displays itself by fever and by the pulse, and may require a powerful antiphlogistic treatment.

All pathological symptoms are dependent on the nature of the affected parts; now the brain, doubtless, belongs to the most compound organs, and is endowed with the special function to be the means of communication between body and mind, and it is that organ in which the psychical activities immediately display themselves, so, here, pathological symptoms occur which are certainly well enough known, but the explanation of which is not so easy. The first place in this relation belongs to the condition of loss of consciousness, which occurs even in a healthy state, but also happens under all violent influences, and in many affections as a striking symptom.

In sleep we are only temporarily unconscious, namely, when we do not dream; for during dreaming the cells of the cortex of the brain are in activity. For the action of these cells, the most exalted which occur in nature, it appears that a quite undisturbed circulation, and a not too highly increased pressure on these parts is necessary. If pressure on the brain arises, for example, in dementia, as consequence of effusion on the brain, where the convolutions appear flattened, then the consciousness is not indeed absolutely lost, but its activity is reduced nearly to zero; for the imbecile almost resemble wax images. They do not speak, do not move, and retain the positions which are given to them. At the same time the mind appears to receive few impressions. If a stronger pressure occurs, through violent congestion of blood, or any other cause, then arises coma, out of which the mind can only with difficulty be aroused, as for the most part it takes no cognizance of what happens.

On the other hand, we see faintings occur in hysterical girls on the slightest causes. If spasm plays a part, then the face is often pale, and it appears that through the sympathetic, which as shown above, narrows the vessels, and in that way acts so importantly on the circulation, the circulation becomes impeded, so that the necessary change of matter in the brain cells does not take place, and accordingly their finer activity is abolished. The mind receives no more impressions, as all ideas, and therefore also consciousness, occur through these cells.

If the cells are overloaded with blood, as in apoplexy or epilepsy, then complete unconsciousness occurs. But this occurs similarly if from copious abstraction of blood, or from hæmorrhage, too much blood is withdrawn from them. If the circulation suffers a disturbance through the nervous system, this does not alter the issue. The cortical cells experience through the slightest causes a disturbance of their operations, and even through the impressions of every-day life, they become so exhausted, that they require sleep for the restoration of their functions, which indeed cannot be similarly asserted of the organs of circulation, respiration, nutrition, and secretion. Through this it becomes more readily comprehensible, why, in local inflammation with consequent softening or suppuration in the brain cortex, those cells so quickly lose their activity and induce no other symptoms, on which account the mischief may remain unnoticed, concealed in the brain. Cells which no longer exercise their peculiar power, their energy, likewise do not act on the mind. For the mind is not in connection with the material itself, but only with the powers which are developed through the material action in the cells.*

The different sorts of cells do not comport themselves similarly in this respect. The perception cells soon cease to conduct impressions to the mind, as, for example, in sleep; but this occurs even when the mind is otherwise occupied, as one may not hear the clock to which one is accustomed, strike. The cells of the cortex of the brain do not lose their power so quickly; ætherised persons no longer feel their pains, but continue their involuntary cry; and they no longer see, although they are not perfectly unconscious. On the other hand, the activity of the motor cells often increases in a morbid manner, when the activity of the cells of the cortex of the brain is abrogated. Thus, consciousness is wanting in epileptics during the violent convulsions—indeed, a perfectly unconscious state usually accompanies convulsions, of whatever kind these may be. It is true that involuntary movements occur with perfect consciousness, especially with affections limited to the spinal cord. For example, after the exhibition of strychnia, consciousness is then not lost, at least, not quickly, so long as respiration continues. If convulsions arise from apoplectic effusion in the corpora striata, then loss of consciousness occurs. In epileptics, convulsions appear to originate in the medulla oblongata, and loss of consciousness occurs immediately, because the lesion acting on the distribution of the sympathetic in the cavity of the skull, and on the circulation in the head, affects the whole brain; but loss of consciousness is by no means always the first symptom, as many authors think. Quite lately I was consulted by an epileptic, who assured me that, on the commencement of the attack, he became first giddy, and then fell down, during which he oftentimes heard the fall itself or his voice, and hereupon only did loss of consciousness occur; indeed, he was often conscious of the first convulsions with which the attack began. It thus happens even that consciousness is not always lost during convulsions.

Generally the perception cells first lose their power, and the cells of the brain cortex only later. At the same time the activity of the motor cells often increases, and this shows a contrast in their natural condition.

Lastly we know also, that congestion and inflammation have different consequences, and cause dissimilar changes according to the different kinds of tissue in the organs affected.

Thus for example, in the subcutaneous cellular membrane, induration and swelling soon take place, because in the extensile tissue albuminous and fibrinous fluid easily transudes and collects.

In the brain, connective tissue occurs only sparingly, for I cannot regard as such what Bidder has here distinguished as connective tissue. The vessels indeed are invested by some connective tissue, but this is no longer to be recognised with certainty on the finest capillaries. The nerve tubules are uniformily glued together in the brain by intercellular fluid, which, however, appears to be present only in small quantity, and to be very albuminous. On that depends the firm consistence of the brain mass. By preservation in spirit of wine or in chromic acid, the intercellular fluid increases in consistence, it coagulates, and on that account the brain becomes firmer in these fluids. But in chronic inflammation or persevering congestion, this intercellular fluid undergoes an alteration, either in its quality or in its amount.

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* It may be remarked here in explanation, that Schroeder van der Kolk firmly believed in the dualism of force and matter, and in this respect coincided entirely with Faraday.—EDITOR.

In acute inflammation, the transudation generally becomes more plastic, it coagulates, and through that the tissue becomes condensed. In chronic inflammation the intercellular fluid becomes more watery, it undergoes absorption, the deposit of fat increases, and the connection of the parts is lost through fatty softening. Lastly, the nerve tubules themselves are destroyed, and cavities are formed. For the most part, however, such cavities are caused by the extravasation and absorption of blood. If a portion of brain so affected is placed in spirit of wine, it sometimes hardens very quickly, and fine sections under the microscope have a granular appearance. But if the intercellular fluid is less albuminous, and if active degeneration is already in progress, then the induration in spirit of wine occurs slowly, and only after lying in it several days, has the brain sufficient firmness to allow of fine sections being made. The fatty masses filling the whole tissue make these fine sections opaque. We also find in it a number of fine granules, which are soluble in chloride of calcium, and which are, therefore, probably not fatty granules but coagulated albumen.

In acute inflammation there are formed, between the fibres and cells of the gray substance, and also in the medullary mass, larger cells which are quite filled with small fat globules. They were formerly called inflammation cells, because they were often found in inflammation, and indeed they occur in the brain only in inflammation.

Whether the corpora amylacea, which I have found among the so-called inflammation cells in the medullary substance, only arise in the dead body, as Stilling assumes, or are already present during life, I must leave undecided.

Section 15.—*Inflammation of the Dura Mater.*

On inflammation of the dura mater we find very little recorded by authors. The disease is said to occur rarely or never, primarily, but only after injuries or caries of the skull bones, and is only just by the way alluded to.

Andral, who collected such numerous observations of brain diseases, has no case of acute idiopathic inflammation of the dura mater. Abercrombie relates only one case, where at the same time the arachnoid, the pia mater, and the brain were attacked, as is generally the case, and this he seems not to have recognised during life. Isolated cases have been communicated by Fizeau, Hankel, Rumler, and a few instances are found in Schoenlein, in Copland, in Bressler (*Krankheiten des Kopfes und der Sinnesorgane*, 1 Thl., 1839). Foville (*Dict. de Médecine, et de Chir. Pratique*, Art. *Méningite*) says the symptoms of inflammation of the dura mater (*Meningitis parietalis*) are unknown. But in the excellent work of Lallemand we find several observations of inflammations and other affections of the dura mater, which arose from injuries, from exostoses, from syphilis, and other causes. He records the characteristic symptoms of this disease in complete correspondence with my observations. Hoppe (*Die Entzündung des Gehirns und der Gehirn-häute*, 1847) has not known the characteristic symptoms of this inflammation; according to him, it seldom occurs primary, or idiopathic, but mostly proceeds from caries or other lesions of the skull, from syphilis or from external injuries. But briefly, yet in a very good manner, we find the most important symptoms stated in Leubuscher (*Pathologie und Therapie der Gehirn-krankheiten:* Berlin 1854, s. 232, and *Krankheiten des Nerven Systems:* Leipzig, 1860); he remarks, also, that the spontaneous or primary inflammation of the dura mater, at least the acute form, very seldom occurs, and that he has only found one case in Abercrombie.

According to my experience, the disease occurs by no means so very seldom, only it appears to be mistaken, and generally to be supposed to be rheumatic headache. But as the dangerous malady manifests itself by decisive signs, and upon the recognition of these the possibility of recovery depends, I think it desirable to communicate some cases which have been observed by myself.

FIRST CASE.

A woman, about 40 years old, came into the outer hospital in Amsterdam, where I was acting from 1824 to 1826, with fever and dropsy, under my treatment; she left the institution, recovered, without any indication of brain affection having shown itself. A year after she again came into the institution, and this time with perfect mental confusion, so that she would take absolutely no medicine. The face was swelled and deeply reddened by congestion; the woman complained repeatedly of severe headache, during which she generally laid her hand on the left side of the back part of the head. An increasing comatose state appeared, so that soon involuntary evacuation of urine and fœces followed. Leeches to the head, also cold applications, and internally a cooling mixture, which, however, was not regularly taken, brought no relief. However, after a few days, improvement took place, and the intellectual power was quite free; the woman now complained only of some giddiness, but this quite disappeared after two days. Accordingly, I gave myself up to a belief in her tolerably perfect restoration, as the headache had also quite left her. However, fourteen days later without any assignable cause, the woman refused all medicine and again very quickly stupor and coma occurred. This lasted nine days, then once more all the morbid symptoms diappeared. In like manner these attacks of sopor were repeated several times, and after four or five days her condition improved of itself. At this time the woman would take neither food nor medicine. Between the attacks the stools were of natural character and occurred regularly. The pulse was not excited but rather weak. The treatment was generally cooling and antiphlogistic. At last a diarrhœa came on, and during a similar comatose condition, the woman quietly expired.

On section, the left hemisphere was found firmly adherent to the dura mater, and above the left ear, near the tentorium, at the upper part of the inferior lobe of the brain, close to the Sylvian fissure, the dura mater was reddened and thickened by inflammation. No softening of the brain was found in this place, rather the brain appeared somewhat firmer there. Otherwise, nothing unusual was found in the body.

I assume from this case, that a chronic inflammation of the dura mater and of the brain may occur, with long and complete intermissions, during which, not even the slightest symptom of disease appears.

SECOND CASE.

A woman, more than forty years old, had for a long time complained of intolerable headaches, the severity of which at last compelled her to seek help in the outer hospital, at Amsterdam.

On admission she was quite confused and had various insane ideas, which after a few days passed into quiet mania. The eyes had a dull expression, and the woman generally lay obtuse, and half unconscious. She used to press her hand against her forehead, which action, doubtless, had its origin in the still present severe headache, but of which she, in her half or completely unconscious or comatose state, only slightly complained. But of a local lesion of the brain, there could then be no doubt. Derivative measures, an antiphlogistic treatment with leeches, and later some doses of camphor, were of very little use.

Six weeks after, consciousness returned, the headache had left, no trace of somnolence was present; the woman felt well, and considered herself perfectly restored; I myself began to believe in this recovery, although I had the sad experience of the previously-related case before me. All the functions were in normal course, and the woman seemed to fail in no way.

Although I carefully watched over the reconvalescence, yet after eight weeks, without any known cause, the headache came back with renewed severity; it was again accompanied by delirium and by various insane ideas, and in a few days coma appeared. There then occurred an involuntary contraction of all the flexors of the left limbs, which I have several times met with in softening of the brain, and soon after that the woman died.

On opening the skull it was found that anteriorly the right hemisphere was firmly adherent to the dura mater. Underneath this adhesion there lay a few hard tubercles, which on section displayed a nearly cartilaginous density, surrounded by a softened, almost pappy, mass of brain. In the posterior and lateral parts of the right hemisphere there were also traces of inflammation, and smaller tubercles surrounded by softened brain mass.

Thus, in so important a brain affection, a complete intermission of all appearances of disease had occurred. I will, in reference to it, also remark that the anterior lobe of the brain was affected; in consequence of which, delirium and confusion of intellect appeared in greater degree than in the first quoted case.

THIRD CASE.

A woman, 36 years of age, of weak and obtuse intellect, complained of unusually severe headache, and on account of it sought help in the outer hospital in Amsterdam. She had a very stupid look. In a few days she fell into a comatose state, which alternated with complete mental confusion. Resolvents internally, a vesicant to the neck, and Autenrieth's ointment to the head, produced no alteration of her condition. After a time I tried in this case also, nitre with camphor; and here, likewise, in six weeks all appearances had so completely yielded, that the woman seemed to have quite recovered. If I dared not ascribe this to the camphor, it yet seemed clear that this medicine had at least not done any injury.

The woman appeared to be in perfect reconvalescence, indeed to have recovered; only she had still a strange appearance of the eyes. On the ground of my former experience, I prognosticated from it a fatal relapse, and this also happened in three weeks, with all the other symptoms, although I took great pains to keep away all injurious influences which could induce a relapse.

The patient became very quickly quite unconscious, had congestion and red cheeks, difficult breathing and slight convulsions. I opened a vein, from which blood with inflammatory character was evacuated, and afterwards employed leeches and cold applications to the head. But the stupor was not lessened thereby, the congestion of the head remained the same, and at last severe convulsions came on and led to death.

Here, also, during the illness, except in the first period and in the comatose state, the appetite was quite natural, but the bowels sluggish. The iris had a remarkably pale colour, which I had observed in several patients, and which I have also since repeatedly seen.

On the section, there was found active inflammation in the liver and in the right lung. This inflammation must have been developed for a considerable time, for the liver adhered to the diaphragm by very firm false membranes, in which I myself was able to inject with quicksilver, newly developed lymphatic vessels, and this indeed is only possible in old false membranes. During life this inflammation had not betrayed itself by any symptoms.

After opening the skull, I saw that on the left side the dura mater was firmly adherent to the hemisphere, and also directly behind the anterior branch of the meningea media, above on the inferior lobe of the brain. Here the brain mass was to such a degree softened and infiltrated with yellow serum, that a large cavity of two and a half centimetres in height and four centimetres in horizontal diameter had formed. Red points were seen all over the brain, which was rather softer than normal. Much serum escaped from the ventricles. The left corpus striatum was not so consistent as the one of the other side.

In this case the inflammation had evidently extended more over the whole brain; it had advanced even to the ventricles, and had attacked the corpus striatum; this indeed explains the convulsions which occurred at the time of the last relapse. The recurrence of the disease with such severity, in spite of all injurious influences having been as much as possible avoided, in this case deserves attention.

Probably already in the first attack an extensive inflammation of the pia mater was developed, and to judge from the disturbance of the intellect, the cortical layer was at the same time drawn within the region of the morbid influence.

FOURTH CASE.

A woman, fifty-seven years of age, who had long suffered from violent headache, and complained of fulness and throbbing in the head, came in 1826 into the outer hospital at Amsterdam. The tongue was loaded, she had vomited repeatedly, and she complained of stiffness in the limbs. Solvent and derivative remedies were employed, and leeches were applied to the head. The bowels were evacuated, but fulness of the head and sleepiness, difficult and faltering articulation remained, as well as contracted pupils, foul tongue, bitter taste, and great thirst. By the continued use of tartar emetic, of solvents and clysters, the bowels were regulated, but at the same time the brain symptoms increased, and in five days the woman fell into a comatose state with half closed eyes and open mouth. She lay generally on the right side. The right arm was always bent, but the left arm was pressed on the left side of the head, an indication that she still felt a dull pain there. The next day the mouth was drawn to the left side, the pupils were still more contracted, especially the right one, articulation was also much impeded, and the sopor continuing, the patient replied to repeated addresses, with only a single word.

Some days afterwards, when the arm was in the bent position, paresis of the right leg came on, and soon passed into complete paralysis. A continual whining, occasionally interrupted by a screaming out, proved the severe persisting headache.

Thus continued her state from March 28th to April 4th. Then under the use of antiphlogistic and resolvent measures, a remission of the symptoms occurred. The eyes were more opened, the pupils were no longer so much contracted, which the right especially had been; the left eye was reddened by distended vessels; the distortion of the mouth ceased, and the sopor appeared to vanish; but the urine was still passed involuntarily, and the woman now complained of violent headache on the left side, and behind in the region of the vertex. She was not delirious.

In a few days the morbid symptoms returned with renewed severity. The right arm was bent and stiff, and felt cool; the woman could hold nothing fast with the left, probably in consequence of loss of sensation coming on; the right pupil was again more contracted. As only very little dark urine was now passed, I directed the use of the catheter, through which a large quantity passed away. Both legs were also again strongly drawn, coma and loss of consciousness increased. On April 18th convulsions appeared, and in these the woman died.

On section, much indurated matter was found in the colon. The cæcum was inflamed and hardened in some places even as firm as cartilage; the liver was inflamed and full of tubercles; on the spleen there was an almost cartilaginous plate; the lungs were adherent and hepatised internally. On the left side, above and behind in the vertical region, to one centimetre from the falx, and two centimetres above the tentorium, the dura mater was much inflamed and thickened, and adherent to the arachnoid and pia mater in an extent of about seven centimetres. Under this adherent part the arachnoid contained pus, the vessels of the pia mater were much distended, the cortical layer appeared much reddened, and numerous blood points appeared in the medullary substance, the optic thalami, especially the left, were strongly reddened, the brain itself felt rather more firm. At the base of the skull purulent serum was found.

This case also supplies a proof that one may be in error as regards the removal of indurated matter from the colon, although for a considerable time a daily evacuation has been ensured by solvents and aperients as well as by clysters. The degeneration of the colon was not of recent occurrence, but the symptoms proceeding from it, were marked by the prominent brain phenomena. Probably the whole ground of the disease lay in this obstruction, particularly as the posterior lobe of the brain was affected, on which the reflex proceeding from the colon usually acts earlier than on the anterior part of the hemispheres. The induration and thickening of the colon certainly at last contributed much to the difficulty of dislodgement of the hardened masses.

I will observe that the left posterior lobe and the left optic thalamus were affected, nevertheless the right pupil was the more contracted during the increase of the disease, against which the vessels of the left eye, thus, on the side inflamed, were most distended. The anæsthesia of the left arm may have stood in relation to the affection of the optic thalami.

In this case an intense inflammation in the posterior section of the hemisphere existed, without the anterior lobe being attacked. Accordingly delirium was absent, thus differing from the second case where the anterior lobe was diseased, and violent delirium occurred. From the intensity of the inflammation, the intermission was only of short duration, and not quite complete.

The case is also instructive in this, that it shows us that in such comatose conditions, even when the urine continually dribbles away, the bladder may, nevertheless, be quite full.

FIFTH CASE.

A plethoric man between forty and fifty years old, a year and a half before his last illness, sustained a fall on the vertex, and, at the same time, had a rib broken. Soon afterwards he had an apoplectic attack, and the right arm was paralysed, but not the leg. After some time his state improved, but the arm still remained paralysed. He had also some suffering in the lower jaw, which, half a year before the fall, had been broken in the violent extraction of a molar tooth.

In the summer of 1825 he came under my treatment in the outer hospital at Amsterdam. He complained of violent headache and oppression of the chest, and the arm was still paralysed as before. After no very long treatment these symptoms of disease disappeared, except the paralysis of the arm, and the man left the institution apparently cured.

In March of the following year he was again brought in there quite unconscious. He had great congestion of the head, a hard pulse, and lay always on the right side. A free bleeding evacuated blood of very inflammatory character; the sopor did not diminish through the bleeding, but it was remarkable that the patient carried the right arm, which, up to this, was paralysed, to the head. The movement seemed partly voluntary, in so far as the left side of the vertex was rubbed with the right hand; again, it was also so far an involuntary movement induced by contraction of the flexors by which the arm is set in firm contraction, as that if one extended it by violence or intermission, it again of itself returned to the head. At the same time the patient now lay on his left side, which seemed to be paralysed, as no more movements were undertaken with it. The right half of the face also was paralysed, since the cheek muscles and the angle of the mouth hung down here. Urine and fœces were evacuated involuntarily.

The head was cupped, but without improvement being obtained. The following night violent convulsions occurred, during which the man died.

On section, the skull was found much thickened, which is not unfrequently seen in chronic inflammation of the dura mater. In sawing it through, much blood escaped on the left side and behind. The dura mater here, behind and above, over the left hemisphere, was much thickened and firmly adherent to the brain. The surface of the brain was dry, probably in consequence of distension, through which the serum was pressed away. The cavities of the brain contained much bright yellow serum.

The medullary substance of the brain was softened quite to a pap, under the portion adherent to the dura mater, as far as the lateral ventricle, and some yellow serum was found between the nerve fibres. The softening, in a rather oblique direction, had a diameter of not less than eleven centimetres. In the middle of the softened place, where the dura mater was most affected and most thickened, the brain matter formed as it were a large tubercle of about three and a half centimetres in size; to a depth of two centimetres it was quite hard, and of a red colour, and firmly united with the dura mater. Yet it was not a tubercle, for the border of the indurated part passed over into the softened, and the acutely inflamed portion was surrounded by a softened mass. The skull was carious at the affected place, and the corroded bone felt rough. This was probably the place where the violence of fall had previously acted. Through this external violence, a chronic inflammation of the dura mater had probably been developed, and at the first sojourn of the patient in the hospital, I had seen those additional symptoms which in such injuries are accustomed to disappear of themselves.

The half voluntary, half involuntary movement of the right arm and the paralysis of the left are worthy of notice. Probably irritation of the left corpus striatum or of the left thalamus existed, and perhaps later, pressure of serum in the ventricles produced the paralysis of the left side.

The paralysis of the right arm alone might perhaps be interpreted in favour of the assumption of Pinel Grandchamp, that in affections of the posterior lobe and of the thalamus, the arm, in affections of the anterior lobe and the corpus striatum the leg, becomes paralysed. But I have as little evidence as Andral in favour of this proposition.

The involuntary pressure on the affected part of the head, in spite of the existing coma, points to the violent headache.

I will also mention as something unusual, that the lower jaw on one side as far as the infra-maxillary foramen, was as thin as a quill, and that the anterior and posterior parts were only connected with one another by ligaments.

SIXTH CASE.

This case has already been fully described by G. A. F. Quarin Willemier (*Diss. de Otorrhœa, Traj. ad Rhen,* 1835, p. 57). It concerns a mason who was thrown down by a falling wall, remained hanging, head downwards, in a scaffolding, and while in this position was struck by a heavy stone on the angle of the right side of the lower jaw, whereby the glenoid cavity sustained a severe injury. From that time the man complained more or less of headache on the right side. After the lapse of five years, this headache, which had extended over the forehead and vertex, increased to such a degree that the man was nearly driven to desperation, had no rest day or night, and at last became insane, and then the pain in the head seemed to cease. At the same time, deafness of the right ear came on, as well as paralysis of the left facial nerve, and to these were later added, strangely enough, ptosis and external strabismus of the right eye. No other appearances of paralysis were present.

On the 12th of January, 1835, that is, eight years after the accident, the man was received as an imbecile into the Utrecht Institution for the Insane. After a time the man's condition once more improved, and he could again work without complaining of pain. But on a sudden, without known cause, the pain again increased very considerably, an apoplectic attack occurred, speaking and swallowing became difficult, and the right eye looked red and swollen. The apoplectic attacks were repeated, but on the 2nd of March of this year the man, although very weak, was again quite in his senses. He was conscious that his death was imminent, and in consequence made some arrangements. He died in the following night.

The dura mater over the fovea glenoidalis was found nearly as hard as cartilage, and certainly two lines thick. The under lobe of the brain, from the Sylvian fissure even to the edge of the cerebellum, was firmly adherent to the dura mater, and at the same place, softened to a sero-purulent infiltrated pap. Puriform serum was effused at the base of the skull, at the crura cerebri, at the pons, at the medulla oblongata. The inflammation of the dura mater in front of the petrous bone, reached to the lesser wings of the sphenoid and the cavernous sinus, where the oculomotorius showed signs of acute inflammation, which explains the ptosis and strabismus. The remaining nerves appeared to be healthy. The dura mater of the petrous bone was not diseased, yet the tympanic cavity was quite full of plastic lymph, the ossicles of the ear were reddened by distended vessels, and a similar condition was visible both in the vestibule and in the semicircular canals. Above and in front, the pia mater was so closely adherent to the hemispheres, that it could not be drawn off the cortical layer without the latter being destroyed. Doubtless the inflammation of the dura mater had been induced by the injury sustained eight years previously. As to whether that injury had caused a fissure, or whether the condyle of the jaw was degenerated, I can state nothing, since I was only permitted to examine the brain.

I might communicate yet other cases from my observation, especially some where the inflammation of the dura mater had come on after the otorrhœa and caries of the petrous bone.

However, I will for the present be content to refer to a case observed by myself, and described by Tobbe (*Over de ontsteking in de voorhoofdsboezems:* Utrecht, 1860, p. 41). It relates to a woman in whom inflammation and suppuration of the frontal sinus spread to the inside of the skull, and induced an extensive, finally sub-purulent, affection of the pia mater, under which the woman succumbed.

On the other hand, I will now communicate two cases, from which we may conclude that this dangerous and easily mistaken inflammation of the dura mater may yet be conducted to a recovery, if only we employ an active treatment.

SEVENTH CASE.

A strong powerful man, about 45 years old, who had from his youth enjoyed good health, in November, 1832, without known cause, suffered pains in the arm and leg of the left side, which pains seemed to disappear again by wrapping the limbs in flannel. There came besides, from time to time, a feeling of loss of power in both hands, which certainly soon vanished again; this recurred about every eight days, and continued for a quarter of a year. Soon after, a swelling appeared in the left knee joint; this was very painful. By poulticing, it passed into suppuration, and evacuated a large quantity of matter, after which the wound closed. In December, pain came on in the left side of the back of the head, near the ear; it continually got worse, and on account of it the man consulted a physician in January. At night, in bed, the pains increased in severity, and as they could not be referred to syphilis, they were regarded as rheumatic pains, which conclusion the unfavourable weather seemed to warrant. Diaphoretics, especially Dover's powder, were given, a blister on the neck was for some time kept discharging, and thereupon the pain left.

In October, 1833, the man came again to his physician, for the pain had again broken out with severity in the same place, and extended to above the ear. For a long time he had remained quite free from pain, but for some time the pains had again occurred, periodically, and now they had increased to great severity. The pulse was weak, not feverish; the eyes dull and watery, the face pale. At the same time the bowels were sluggish. At first a purgative was ordered, then diaphoretics and Dover's powder, in turn. The pains, however, did not abate, and four days after, on the 17th of March, the patient demanded my help.

I found the patient in a very unsatisfactory condition. On the head, which, on account of the supposed rheumatic suffering he had quite covered up in flannel, there was seen some œdema, the face was pale, and the pains in the head appeared to rage with uncommon severity. Any bending of the head was impossible, on account of violent increase of pain, and the patient was obliged to sit upright in a chair the whole night through. To that came a sub-paralytic affection of the left arm, which indeed continued only a quarter of an hour, leaving behind it only convulsive movements. The eyes were rather dull—the sight of the left eye was weakened—its pupil was somewhat dilated. The memory failed almost completely, and the man seemed on the point of falling into perfect dementia. The pains extended chiefly over the left ear and region of the back of the head, and combined with them, was a loud noise in the ear.

I immediately diagnosed a dangerous inflammation of the dura mater, which had already extended to the arachnoid and pia mater, and had also affected the hemispheres, by which the intellectual powers were injured, and also that an otitis was approaching.

Accordingly, I adopted with decision an antiphlogistic and derivative treatment. The envelope of flannel round the head was replaced by cold applications, and on the painful part of the head I had eight leeches applied. Internally I ordered—

℞ Tart. emet., gr. 5
Aq. distill., unc. 5
One tablespoonful to be taken every hour.

October 18. The pain has been somewhat relieved by the leeches, but is still pretty severe. The antimony has not caused any nausea, nor has it acted on the bowels. Otherwise his state is unaltered.

October 20. The pain in the head is still very severe, but appears to be concentrated on one point, obliquely above the left ear. At this part I had an issue applied; I acted on the bowels by lenitive electuary, and continued the tartar emetic and the cold applications. This treatment was carried on, the dose of antimony being from time to time increased.

October 29. At this time one scruple of tart. emet. was taken in 5 ozs. of water. Under this treatment, the pain in the head had lessened considerably, and the whole appearance of the patient had improved. The convulsive movements of the left arm had diminished soon after the application of the issue, which now suppurated freely. There was also constant nausea, but the bowels were always sluggish. On that account I ordered—

℞ Tart. emet., scrup. 1
Extr. Aloes, gr. 10
Fell. Tauri inspiss.
Pulv. Liquir. ana., dr. ½
Fiant pil., Nr. 40: three to be taken five times a day.

November 3. The pains are much lessened, and the bowels are regularly open. As the patient was free from nausea, I ordered the pills to be taken seven times a day.

November 11. The general condition improves. The nights are calmer: the patient can lie down again, and is refreshed by sleep. The noise in the ear has considerably diminished. But with increasing improvement the tolerance of the tartar emetic diminishes, so that three pills already occasion nausea, on which account the dose is reduced to two pills seven times a day. The bowels are open two or three times a day.

November 13. The headache is so much diminished that the patient is only very little inconvenienced by it. The eyes have a more lively expression, the pupils are no longer unequal, and the sight of the left eye has improved. The improvement also holds good for the intellectual powers: the memory is returning, and new life is, as it were, spreading over the countenance. The issue is active, and on account of the copious evacuation of fœtid matter, requires to be dressed several times a day. The appetite remains good, the patient complains somewhat of acid in the stomach, therefore a drachm of Sapo medicatus was added to the pills.

November 16. The acid eructation has ceased, the noise in the ear is quite gone, and the pulse is fuller and stronger. The tolerance of the tartar emetic is still lessened, he therefore takes two pills only five times a day; thus, altogether, five grains daily.

November 18. The patient had taken two pills fasting, when the tartar emetic much more easily causes nausea and vomiting, thus I found him vomiting at my visit. I inquired if the vomiting did not cause him a headache: but he assured me that he always felt lighter in the head after vomiting. The soft and weak pulse showed distinctly enough the depressing effect of the antimony on the vascular system.

The nights are now quiet, and the patient scarcely feels pain in the head at all. He can again concern himself about his business. The issue causes pain, and is very inconvenient to him; he wishes to have it abolished, but I advise him against this. He now again went out of doors, and discovered to his astonishment, that although he was born in the town, he had quite forgotten all the names of the streets and the way about. When upon his inquiring, the name of a street was told him, he committed it to memory again, and he thus learnt afresh the ways in the town.

At last, after a few days, he seemed to be quite recovered, for he was now completely free from pains in the head. In spite of my warning, after a time he had the issue healed, as he fancied himself quite recovered, and would not be impressed of the insidious character of the disease.

On the morning of the 28th of January in the following year, after having eaten a full supper the evening before, the man suffered a violent attack of apoplexy. A vein was immediately opened, and six leeches were applied to the head. After that consciousness returned in some degree, but it was soon evident that the man had lost the power of speech, and did not quite recognize those about him. On the following day, as severe pains in the head came on again, six leeches more were applied to the left side of the head; foot-baths were used and a blister was applied to the neck, as the patient was unwilling to have the issue renewed. The bowels were again sluggish, and required to be assisted by aperients and tartar emetic.

Under this treatment the condition of the patient remained nearly unchanged, especially as concerned the pain in the head. Speech was difficult and faltering, and the patient could not, for the most part, find the right words; but periodically the speech became better. As the pulse showed no particular tension, the patient took a weak infusion of arnica, and with that the power of speech seemed to improve slowly, until the 25th February, when a fresh apoplectic attack came on, through which not only was speech quite lost, but also the capacity of recognising his relations.

I now doubted the possibility of a recovery, because the mischief appeared to have penetrated deeper into the brain, and seemed inclined to assume the form of epileptic attacks. I therefore applied leeches, and determined that the issue should be again established at the old place, and be kept discharging by an irritating ointment. Internally I gave tartar emetic, but this was no longer well borne, and I could only raise the dose to five grains. The pain in the head continued, although it was somewhat less. On the 4th of March a new, but not equally severe attack came on, through which the speech suffered still more.

From this time his state appeared slowly to change for the better. But on the 27th of May the patient observed that another attack was approaching, for speech was entirely abolished, and convulsions were threatening. The patient's wife wished to give him quickly some spiritus nitri dulcis, but inadvertently poured out of the glass containing spiritus salis ammoniaci. Scarcely had the patient swallowed some, when the attack, just on the point of breaking out, was cut short; speech was immediately recovered, indeed, even the impediment in speaking which existed before this attack, was no longer present.

From this time the pain in the head gradually diminished, while the issue remained suppurating; no more apoplectic attacks occurred, and the intellectual capacity was free. Now, however, even a quarter grain of tartar emetic sufficed to induce nausea. I maintained the issue for a long time, until in the following summer, in August, it closed of itself, without any injurious effect.

In the following winter the man again suffered from pain in the chest and difficult breathing. A venæsection and demulcents soon allayed these symptoms, and not the least headache or brain affection appeared therewith. He was now again in his counting-house, and calculating and thinking did not trouble nor weary him. He slept well, without dreaming.

From this time he enjoyed uninterrupted good health, and not until nearly 20 years after, in the year 1852, did he again suffer an epileptic attack, which was preceded by a feeling of heaviness in the head. Speech was not affected by this attack, nor was headache induced by it. I ordered cupping to the neck, and afterwards had an issue placed in the neck; I ensured free action of the bowels, and regulated the diet, which seemed to be too copious. Since that the man has remained well up to the present time (1860).

We see from this case how advantageous in pachymeningitis are active derivative measures, whose local activity is explained by this—that the vessels of the dura mater communicate with those of the pericranium. If only chronic inflammation of the pia mater and arachnoid exists, without adhesion to the dura mater, then derivative measures, although not to be rejected, act less effectually.

This case again shows distinctly that the inflammation of the dura mater is a very insidious disease. The last attack, 20 years after the cure, allows us to suppose that residua are still present in the formerly attacked spot, which we may regard as a quiescent volcano, whence perhaps through an active congestion, a reflex on the medulla oblongata took place, and manifested itself as an epileptic attack.

The psychical phenomena in this case are also very remarkable. Probably the inflammation extended over the pia mater, through which an injury occurred to the cells of the brain cortex, and thus arose the loss of consciousness, and at the later relapse the difficulty of speaking, without any degeneration having as yet taken place. The transition of the arteries and veins in the pia mater itself had also here as a consequence, that the most violent storm passed away over the patient. If the man when he had recovered the first time, no longer knew the way in the town, whilst his intellectual power had otherwise sustained no damage, we may fairly assume, that in a part of the cells, their function remained disturbed without this exercising any particular influence on the other intellectual faculties. It also seemed to be only an insignificant weakness, for a moderate excitement, namely, the renewal of the earlier impression, by hearing the names of the streets, was sufficient again to restore the function. On the later relapse this phenomenon did not again occur.

Further, the rapid effect of the caustic ammonia is very remarkable, by which not only was the epileptic attack cut short in a moment, but also the speech and memory were restored. Such an effect has never since occurred to me, although I have had the remedy tried now and then in approaching epileptic attacks. That effect proves to me that the cells were weakened in their activity, in a paralytic condition as it were, which was immediately removed by the volatile stimulating medicine. I also find in it a proof for my former assertion, that the substance of the brain is not really very irritable, and long resists true inflammation and degeneration.

On the action of tartar emetic, of which I shall speak more in detail further on, this case gives very instructive disclosure. Its depressing effect on the heart and brain even during vomiting, appears in a convincing manner, and even seemed to moderate the brain congestion. Probably, however, a certain saturation by the medicine must already exist, if this effect is to appear. If the vomiting had occcured after the first dose of tartar emetic, then, doubtless, an increase of congestion would have happened.

Lastly, this case also affords a caution to us not to assume a syphilitic foundation, from the nocturnal exacerbations of pain, without further evidence. Here the pain increased, only because the recumbent posture increased the congestion.

EIGHTH CASE.

For the accurate history of the patient in this case, I have to thank my friend, Dr. Roelandt, of Rotterdam, on whose recommendation I was called in as consulting physician.

The wine merchant, Van K., about fifty years old, of spare build, and so-called lymphatic terperament, had hitherto, through his temperate manner of life, enjoyed continuous good health. In the year 1854, he suffered at intervals from furuncles. One of them was developed in the neighbourhood of the eyebrow; two others, which were preceded by a troublesome itching, on the inside of the alæ nasi. By appropriate surgical treatment they subsided without further derangement of the health, although a few smaller furuncles followed afterwards.

In the first four months of the year 1855 many unpleasant sensations occurred in the head, a feeling of pressure, sensibility to disagreeable penetrating noises, weakness of sight in reading and writing, sleepiness, peevishness, weariness soon induced by thinking. These symptoms gradually increased, until in the first half of June a more decided headache occurred, which slowly increased in the two following months. At first this headache came on only in the morning. The man could not then attend to his ordinary business; he sat down still, held his head in both hands, and now and then fell asleep, through which the headache sometimes became worse, sometimes diminished after a longer or shorter time, again to occur at indefinite hours, by day or night, and under various exciting causes. At the same time the bowels were sluggish, on which account house medicine and an appropriate diet were brought into requisition.

Notwithstanding the greater sleepiness, the sleep was not refreshing; on awaking the pain in the head was rather more severe. Why the attacks of pain came on, or why they stayed away, could not be discovered. By coughing or sneezing the pains were increased.

The forehead above the eyebrows was distinguished as the seat of the pain; from this, if it increased, it extended over the temples as far as the neck. On the first occurrence of this pain, a troublesome itching in the nose had again appeared, as twice before with the development of furuncles in the nose, and accordingly the patient expected another furuncle; but, instead of that, there came headache in irregular paroxysms, but no more completely intermitting.

The objective symptoms of the disease were as follows:—1. Paleness of the face, dull and sullen expression of the only slightly injected eyes, lowered temperature of the skin, especially of the limbs, increased temperature of the head, especially at the forehead and vertex. 2. In standing the patient has not the energetic demeanour as usual, he likes to sit, supporting his head on his hand; in lying, all motions are difficult to him. 3. The pulse is rather slow (54-6) sluggish, small, easily compressed. 4. Respiration was slow. 5. Innervation languished, as was to be assumed from the psychical and sensory, and also from the vegetative functions. In the muscles of the legs reflex movements frequently took place, also during sleep.

The diagnosis was not clear on the first visits. On account of sluggishness of the bowels, on the 13th and 14th July, small doses of ext. aloës were ordered, which acted, and after that the headache remained longer absent in the morning.

On the 15th of July 6 grains of tart. emet. in 6 ounces of water were prescribed, by which nausea and copious evacuations were induced. Up to the 24th of July nothing further was ordered. Observation of the patient, proved that he was daily during six hours (from about ten in the morning until four in the afternoon) free from pain in the head, and during this time he could even apply himself to his business; that, on the other hand, during the remaining eighteen hours, the above-described condition was present. We accordingly suspected a masked intermittent (*eine Intermittens larvata*), and ordered—

℞ Chin. sulph., scrup. 1
Ext. Liquirit, dr. 2

Fiant pil., No. 40. Two pills to be taken every hour during the daytime.

Upon this the headaches ceased, a quiet and natural sleep came on, and from August 2nd the patient discontinued the pills. The cure was however of short duration; already on the 8th of August the former condition had again appeared. We supposed a relapse of the intermittent, and again ordered quinine; this time, however, without result. The symptoms rather increased in severity, and there was no longer a regular intermission.

Shower baths were now recommended to the patient; but they had no result. Six leeches behind the ears, with free after-bleeding also produced no improvement, rather, all the morbid symptoms got worse with the continuance of the headache; the sleep was more like sopor, and the patient awoke always with more violent pain in the head; the reflex movements in the legs occurred more frequently; also on one occasion, although transitory, an irregular dilatation of the pupil was perceived. The evident congestion of the head, and the blood stasis called for active derivation.

On the 29th of August there was ordered—

℞ Tart. emet., gr. 6
Mucil. gummi. arab.
Aq. Naphæ ana unc. 1
Aq. distill., unc. 6

One tablespoonful to be taken every hour.

On the 30th of August this solution was repeated. On the 31st of August an infusion of senna with Anima rhei and six grains of tartar emetic, was ordered, together with cold applications to the head, and sinapisms to the calves of the legs. Copious stools followed.

On the 1st and 2nd of September, the same measures were employed, and then, for the first time, copious watery vomiting with admixture of bile took place. To this soon succeeded an agreeable calmness and relaxation, quiet sleep, waking without headache; uniform temperature and moist skin, improvement of the slow pulse, copious evacuation of urine. The patient felt himself decidedly better, and one again entertained hope of his recovery. In order to maintain the derivation, a blister was placed on the neck.

However, already, on the 3rd of September, the morbid symptoms reappeared; indeed, the expression of the disease came forth more decidedly than before. Extr. aloës aquosum was given even in increasing doses, but without result. The morbid symptoms only increased. The patient fell into complete lethargy, the forehead felt warmer, and above the eyebrows, was distinctly reddened; the pulse sank to fifty beats.

On the 6th of September, I was called into consultation. I found the patient in the state described, quite unconscious, and I immediately diagnosed a pachymeningitis. I had four leeches applied to the nose, and the after bleeding encouraged as much as possible; and as tartar emetic is tolerated better and in larger doses in the form of powder and pill than in solution, I ordered internally—

℞ Tart. emet., gr. 9
Sacch. alb., dr. 3

Divide in partes æquales 9. One powder to be taken every two hours.

I also advised the sore on the neck to be brought into active suppuration; I ordered cold applications to the head, sinapisms to the calves of the legs, and a clyster. The latter produced a copious evacuation, and after this five watery and bilious discharges followed. The leech bites bled copiously. Even on the evening of this day the condition was essentially improved; the patient was conscious, the pulse had risen to sixty beats, the skin felt warm, the urine passed more freely, and was no longer so dark. The night passed calmly, and in the course of it the headache vanished.

On the seventh the pulse was counted sixty-six, and the patient took some food. The powder, the sinapisms, and the clyster, were repeated, and the suppuration in the neck was promoted.

In the evening the pulse fell again (sixty-two beats) and was smaller. The patient lay on his side, bent forwards, manifested incorrect ideas of several things, and assumed a very commanding tone. I had given warning that after some alleviation of the morbid symptoms a relapse would occur, and, on account of this, six leeches were applied to the forehead, and the after bleeding was maintained by elastic cupping glasses, so that the blood evacuated amounted to about five ounces. After that quietude and relaxation occurred, and the patient had a peaceful night.

September 8. No trace of headache; the confused ideas have disappeared; the head and the rest of the body have a normal temperature; the pulse is fuller, with sixty beats in the minute; the tongue less coated and more moist; nothing more is seen of the restlessness and reflex movements of the legs. The powders were repeated. An ounce of castor oil was also ordered to be taken in two doses.

September 9. The night has passed quietly. The psychical functions are pretty good, only in the memory and knowledge of time is there any disturbance; headache is not present. The powders have not produced any nausea, and accordingly are to be repeated. Towards evening the patient becomes less quiet, and is only with difficulty kept in bed. A cloudy sediment is seen in the urine.

September 10. The sleep has been deep, the breathing groaning, occasionally interrupted by hiccup. Much urine was passed in the morning. The pulse was more developed, the temperature somewhat raised. Chewing and swallowing are impeded, and the patient will not take anything in the evening. He decidedly refuses to take the powder. A clyster has only little effect.

September 11. The night has passed quietly. The pulse changes between fifty-five and sixty-five beats. Taking the powder is steadfastly refused. On the second visit the continuance of the tartar emetic was insisted upon, and it was ordered in smaller doses, namely:—

℞ Tart. emet., gr. 10
Extr. Hyoscy. aq., scrup. 1
Extr. Liquir., dr. ½

Fiant pilulæ, No. 30: one to be taken every two hours.

Up to the 15th September the condition remained good, it even improved daily. The pain in the head had quite left, the intelligence and state of mind, except for a rather excited condition, left nothing to be wished for. The sleep was quieter, and was free from dreams, which hitherto had been constantly troublesome. The pulse was 70. The patient could leave his bed for some time without any fatigue. The tongue had a greyish coating, and appeared as if swollen; but with this the appetite was quite good.* The tartar emetic was therefore omitted for a few days, and then the tongue again assumed its natural appearance. On the 13th a clyster was administered, 1 oz. of electuar lenitivum with 4 gr. extr. Hyoscyami was also ordered.

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* This occurs often in maniacs, and indicates a still continuing irritation.

September 16. The patient is again to-day in quite another condition, and the hope of a restoration is for the third time overthrown. On the previous evening the hands gradually became cold, as in the preceding relapses, the headache had re-occurred, and the night was not passed as well as before; in short, all pointed to a return of the former unfavourable state, and it was thought that the cause must be ascribed to an error in diet. The patient lay apathetic, and complaining of headache on the same side. The temperature of the skin was lower and unequal; the heart beat sixty times in the minute. As fresh congestion and inflammation were to be feared, four leeches were applied to the forehead, and the after-bleeding kept up by elastic cupping-glasses. Sinapisms were applied to the calves of the legs and soles of the feet, a clyster was given, and internally elect. lenitivum and tartar emetic again.

September 17. He has not been very restless during the night. The pain in the head was no longer so severe, but there were occasional traces of aberration, and there existed great indifference and moroseness. The appetite was quite good, the bowels were properly evacuated. At the evening visit, the patient declared that he was free from headache, and had again slept calmly. The heart beat sixty times in the minute. The tartar emetic was again taken without aversion.

September 18. In the night he had a thin, not copious, stool. The appearance of the patient is not so good; he has an expression of suffering, a cool dry skin, pulse fifty-seven, more headache, and his whole demeanour proclaims nothing good. Six leeches were again applied to the forehead, and the after bleeding was kept up by cupping glasses. Tartar emetic was given without extract of hyoscyamus, cold applications, and also a clyster were employed.

As these dangerous relapses were constantly occurring, the physician was led to the supposition that he might have to do with a specific inflammation, a consequence of the furuncle dyscrasia, with which the disease had commenced, and which although repressed by the active antiphlogosis, might yet not be quite removed. He, therefore, resolved on the use of sublimate as a means which destroys the germ of disease, and which in his experience had proved effectual in acute external inflammations, which had for weeks together resisted the most active antiphlogistic measures. He ordered—

℞ Merc. subl. corros., gr. 1
Sacch. alb., dr. 4

Divide in partes æquales 24. A powder to be taken every three hours.

He was the more led to this, as on this occasion the evacuation of blood had not been of the least use, but the symptoms had rather increased in severity.

I had been absent for some days and was now again consulted. I had nothing to object to these small doses of sublimate, but did not expect much from them.

On the 19th of September, the state was still the same. The heart beat forty-eight times in the minute, the patient was quite indifferent and impassive, and had pain in the head on the slightest motion. A small quantity of dinner has been again vomited. In the evening two leeches were applied to the nose.

September 20. After the application of the leeches, there was an improvement in his condition, and the night was better. A clyster acted only moderately: vomiting had not recurred. The pulse has risen from forty-four to fifty-six. The headache has moderated, the patient is more conscious. Evacuation of urine is copious. The sublimate is continued.

From the 21st to the 23rd, favourable and unfavourable symptoms alternated, but the latter were evidently predominant.

September 24. The patient is much worse, and the hope of a favourable issue becomes less and less. Although no further decided exacerbations of the headache have occurred, yet there is evidently greater loss of feeling; obtuseness and indifference, probably hinder the manifestation of pain. The patient scarcely speaks at all; he scarcely gives occasional utterance, with difficulty, to a word. He may, indeed, see with his eyes, but they do not give the impression of his really perceiving. A similar attitude is maintained day and night. The difference between sleeping and waking is scarcely apparent. He takes almost no food, and drinks only seldom. In consequence, during the last few days, general emaciation has more decidedly appeared; this may be due as well to the weakened influence of the nervous system on the vegetative functions, as to the diminished supply of nutriment. The adynamic character of the disease becomes more and more apparent, and a low state of innervation, with absence of all paralytic appearances, so that we seem enjoined to interfere with stimulants. On this ground an infusion of arnica flowers (1½ drachm to 6 ounces) was ordered, and at the same time the sublimate was continued. A clyster was also given. Towards evening a still greater decline occurred, and a large blister was now applied, reaching from the forehead to the vertex and to the temples.

September 25. The night has been passed peacefully. The patient groans occasionally. The pulse is rather more developed, but still beats only forty times in a minute; the temperature of the skin is more natural, swallowing is less difficult than on the previous day. The administration of the arnica is now regulated according to the temperature of the skin.

September 26. Violent headache, although of short duration, came on in the night. The intellect is very dull, and only strong impressions act on the much-depressed vitality. The pulse has risen from forty to fifty. The patient swallows with trouble and resistance, and nearly every single word sticks in his throat: only rarely do lucid intervals, as it were, of the power of speech occur, in which he expresses anything with ease. He rather appears to sleep than really does so. As the blister has not yet drawn, it is replaced by another. Another clyster is also given.

September 27. The urine for the first time has a copious sediment, which however was not the case on the next day. The lachrymal glands secrete copiously, and their fluid collects between the lower eyelid and the bulb, likewise at the inner angle. This also continued the next day. The tongue is moist, and appetite is again present. The same measures are continued.

September 28. The condition is, on the whole, more favourable; the respiration is good. Up to now, three and a half grains of sublimate have been administered, without salivation showing itself. The arnica always quickly increases the temperature of the skin, the patient positively refuses to take it.

September 29. During the night the patient has been tolerably quiet. The sublimate is now continued in only half as large a dose.

September 30. In the morning the patient's state was just the same, but in the evening a favourable change occurred. The patient raises himself up quite unexpectedly, speaks much, eats and drinks with appetite, without being so much excited thereby, as previously when improvement was coming on. He speaks quite intelligently of the danger which has so long hovered over him, and seems to be apprized of all. He feels quite well, has a pulse of fifty, and is free from headache.

October 1. The night has been passed tolerably calmly; no pain in the head, no disturbance in the intellectual functions, pulse 50. The bowels are acted on by lenitive electuary, and the sublimate is continued.

October 4. The blister is taken away, and is only maintained as an exutory in a half-moon shape on the frontal protuberances. From this time the improvement progresses decidedly from day to day, all disquieting symptoms vanish, and the pain in the head remains absent. The sublimate is still continued at one forty-eighth of a grain, and the lenitive electuary is given occasionally.

October 13. The exutory is properly maintained, the dose of sublimate is further diminished. On the forehead small furuncles are developed from irritation of the skin. No trace of salivation. The diet is carefully regulated. As convalescent, the man leaves his bed for some hours in the day.

The improvement now proceeded uniformly. On 8th November one counted 82 regular pulse-beats, the emaciation is again partly compensated, and with prudence some affairs can already be attended to. Up to now about six grains of sublimate have been taken.

From that time up to the present (1861), the man has always remained well; he is only annoyed that his head is easily affected by the wine vapour in the cellar. The headache, however, has never returned. We may well say that in the obstinate struggle with the storming Death, a brilliant victory has been achieved.

This case proves most decidedly how obstinate and insidious is pachymeningitis, to which especially frequent relapses with renewed severity seem to belong. That this inflammation had extended to the pia mater is indeed clear enough.

The case teaches us that in paralysis of some of the functions of the brain, among which the, at last, so-much-impeded swallowing is to be counted, and the disturbance of the mental functions, we need not straightway imagine a disorganisation. When the congestion and inflammation extended to the cortical layer, and even to the deeper parts of the brain, functional disturbances indeed resulted, but no actual disorganisation had yet occurred. We have here also a fresh proof that the brain substance is only slowly brought into an inflamed condition.

It is remarkable, that on the outbreak of the disease, the attacks appeared to occur with a fixed type, and even yielded to quinine. In the further course this was different. Through that the insidiousness of the disease is only increased. I was misled by it on one occasion in another case to which I was called in consultation, when the severe headache ceased under sulphate of quinine. After a few days the pain in the head appeared again with periodic attacks, and although I suspected a pachymeningitis, I agreed in a repetition of the sulphate of quinine, with simultaneous employment of leeches and of blistering plaster to the neck. At my second visit I found this patient, who dwelt out of town, already moribund.

The case of Roelandt shows further that the leeches must be applied as near as possible to the affected part. Leeches and a blister to the neck, at the commencement of the medical treatment, had availed nothing. On the other hand, the leeches to the forehead did good (not the last time, it is true), and still more the leeches to the nose, on account of direct derivation from the affected spot. If the inflammation had affected rather the back part of the head, cupping on the neck would have been more in place.

The use of active derivation in the neighbourhood of the part attacked, was also confirmed here. I cannot ascribe the cure to the small doses of sublimate which the patient had taken. During the use of this remedy, the condition was still bad enough. It was only when the large blister over the whole forehead took active effect, that the inflammation of the dura mater yielded, with all its consequences.

The salutary effect of such derivations, as well as the powerfully depressing action of tartar emetic, I have also experienced in two cases which I will only mention in a few words. A woman had a pachymeningitis running its course with severe pains, and affecting chiefly the vertical region; gradually even epileptic attacks appeared. Leeches were repeatedly applied, and an issue on the vertex was kept open more than a year, by which a complete cure was obtained. A purulent discharge from the nose occurred of itself, and this had improved her condition. The other case also occurred in a woman; the inflammation of the dura mater and the acute pain, which had been taken for rheumatism, occurred here over the left ear. An issue, which was kept in active discharge, and repeated application of leeches, at last suppressed the tedious disease which had been accompanied more than once by cerebral symptoms. In this case purulent otorrhœa occurred, which, however, left no deafness behind it. In both cases serious relapses several times took place.

From my experience, which is not entirely exhausted by the preceding cases, I cannot hold idiopathic pachymeningitis, independent of external injury or syphilis, to be so rare a disease as authors affirm. I believe the disease is frequently mistaken, and supposed to be a febris larvata, on account of the regular intermissions, or more frequently a cephalæa rheumatica.

At first sight it may appear strange that this inflammation is distinguished by such intense painfulness. It must be remembered, however, that the dura mater cerebri consists of two layers, of which the outer forms the periosteum with which the dura mater proper is coherent. The great painfulness in consequence of inflammation, is possessed by the dura mater in common with the periosteum of other bones. The dura mater of the vertebral canal, separated from the periosteum, is, according to my experience far less painful in inflammations, than the dura mater cerebri. Also degenerations, ossifications, and even inflammations of the falx cerebri appeared in a few cases which have occurred to me, not to pursue a very painful course. In the vertebral canal, an isolated inflammation of the dura mater occurs indeed only seldom, and on that account we have no perfectly pure observations. However, I have not observed the pains occurring here in such severity, although, perhaps, they proceeded from other parts. If the disease takes a more chronic course, through which the dura mater unites almost inseparably with the skull, then the severe pains do not always occur. Thus was it with the seventy-two year old man (p. 62), where the skull could not be separated from the dura mater, and where nevertheless no headache had been present.*

The intermittence is also peculiar, it often occurs as distinctly periodic as in intermittent fever, but mostly manifests itself irregularly, so that rather long complete intermissions are distinguished. Here, again, we recognise the correspondence of the dura mater, with the periosteum of other parts. In periostitis generally, the pain comes on more severely during the night, or it has even longer intermissions. Other authors also mention the intermittence of the symptoms of the disease. Especially many observations of the kind are found in the works of the distinguished Lallemand. (*Recherches sur l'encephale:* lettre ii., obs. 5 et 31; lettre iii., obs. 6 et 17; lettre iv., obs. 3 et 20; lettre v., obs. 4, where on account of the intermittence arsensic was given. Lettre vii., obs. 1, 2, 11; lettre viii., obs. 13.)

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* Probably the strong coherence of the periosteum to the bones, and the great tension in consequence of inflammatory swelling, through which an injurious and painful pressure on the nerves arises, contributes much to the painfulness. At least the periostitis, which always occurs after fractures or after amputations, is not very painful, in case the torn edges of the periosteum do not sustain any tension, and are not exposed to pressure.

But in very acute cases these intermissions appear to be absent, or perhaps they were not observed in the beginning of the disease, before medical treatment was commenced. Thus, for example, nothing is said of it in Lallemand (lettre iv., obs. 14; and also in other cases).

SECTION 16.—*Pathological Anatomy of the Brain.*

That irritations and inflammatory conditions of the pia mater, according to the degree of their development, stand in the closest relation with the different forms of insanity, one can scarcely doubt; having regard to what I have adduced, on the cortical layer as the organ of the higher intellectual powers, on the connection between mind and body, on the influence of the body on the mind, as well as on the circulation in the brain. But there are yet some points which are worthy of a closer consideration.

It is well known that the pia mater is covered by the arachnoid. It is generally considered, and I believe with perfect correctness, that the outer layer of the arachnoid lies on the inner surface of the dura mater, that its inner or visceral layer, on the other hand, envelopes the brain, so that it does not sink between the convolutions of the brain, but passes bridge-like from one convolution to another. There the arachnoid is also attached, by delicate connective tissue, to the subjacent pia mater. The latter must be regarded merely as a vascular membrane, from which a serous fluid is constantly exuded, which collects between the pia mater and arachnoid, and even in the normal state appears to be not entirely absent. But if the pia mater is in an inflammatory condition, or even only in a state of great congestion, then not only is the quantity of serum exuded between the two membranes increased, but the fluid also becomes fibrinous, and coagulates after death. In one case I was able to undertake the section of an insane patient, who had sunk into dementia, as soon as six hours after death. After opening the skull and laying bare the brain, a considerable exudation was seen everywhere between the arachnoid and pia mater, which flowed in such quantity from the place of section of the membranes, that I could collect it in a plate placed underneath. In half an hour I saw to my astonishment that the fluid in the plate had changed into a whitish tough mass, which looked just like a rheumatic inflammatory membrane, and could be raised at the edge like a membrane. The fluid must, therefore, have consisted in great part of fibrine which was now coagulated. The membranes of the brain had meanwhile become quite transparent, and had assumed their natural delicate condition, whereas a few moments before they appeared to be thickened. But the pia mater was so firmly united to the cortical layer, that it could not be removed without laceration of the brain substance.

In order to arrive at a correct judgment of the forms and degrees of insanity, we must clearly understand that the anterior and upper part of the brain stands in the closest relation with our higher intellectual faculties, and especially the grey layer or the cortical layer, which lies under the frontal bone and as far as the vertex. If in the bodies of those who have died insane, we carefully draw away the pia mater from this surface, and then cleanse it by dropping clean water from a sponge on it, we observe as follows.

In rare cases, when, namely, the patient died in the onset of the disease, the cortical layer shows an irregular coloration; in some convolutions it appears bright red, in others paler. These shades of colour are sometimes perceptible only on a very accurate examination, and they are the consequences of an active congestion to these significant parts of the brain, or even of an already commencing inflammation. We find it also in patients who have died of typhus or of nervous fever with development of active delirium. More rarely we meet with this alteration in recent cases of insanity also in the inferior or posterior lobes.

With longer duration and with violent onset, the disease has passed into inflammation. We have now difficulty in drawing away the pia mater (whose vessels are generally fully distended) from the cortical layer; indeed, according to the degree of the inflammation, whole layers of the superficial grey cortex will be torn away and remain attached to the vascular membrane. In that case there is nearly always more or less plastic lymph effused between the pia mater and the arachnoid, which by coagulation in the dead body may become so opaque, that it forms a thick white layer, through which the convolutions are scarcely visible.

If through longer duration of the disease obtuseness or imbecility had already occurred, then we no more meet with deep coloration, the vessels are now less distended, and the pia mater easily quits the convolutions, so that we draw it away more readily than in the healthy condition; the grey substance appears pale and anæmic, also thinner and rather atrophied; the exudation which in the preceding stage united the pia mater so firmly with the cortex has quite disappeared; a clear watery serum flows out everywhere, and the vessels, especially at the base of the brain, are, as a rule, covered on their inner surface with bony plates or with atheromatous deposits.

When the changes have proceeded so far we can, as a rule, no longer expect a restoration. But in the second stage—namely, that of adhesion of the pia mater—recovery is even yet possible; for I have met with this* in individuals who had suffered similarly, or not at all so severely or violently, as other individuals in whom recovery took place.

Chronic inflammation of the membranes, and of the substance of the brain, is not always confined to the anterior and upper surface of the brain; when of long duration it also attacks the inner surface of the sinuses and the cavities of the brain. The pia mater in these cavities generally becomes thickened by it; it has sometimes, especially on the septum and in the fourth ventricle, with the light falling directly on it, an appearance as if it were covered with fine grains of sand. There is often found with this a certain quantity of clear serum in the cavities of the brain, through which these sustain a proportionate enlargement. The pia mater on the corpora striata is usually thickened, and generally cannot be drawn away without tearing the softened substance of the brain. During life these changes manifest themselves by paralytic phenomena, which usually begin by tremulousness of the lips in speaking, and afterwards are characterised more definitely by stammering, and by heavy insecure gait. The third ventricle may also become distended with serum, through which distension, the roots of the oculo-motorii sustain a pressure. Through diminution of energy of this nerve the equilibrium between the levator palpebræ superioris and the orbicularis palpebrarum, supplied by the facial nerve, is disturbed, and a ptosis occurs, which indicates a deep, immovable brain affection. If, by continued exudation, the pressure in the third ventricle still increases, then the oculo-motorii become yet more weakened. There now appears an unequal action between the internal recti muscles of the eye, which are supplied by the oculomotorius, and the external recti muscles, which are under the domination of the abducens, and a more or less marked external strabismus appears.

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* *I.e.*, the adhesion of the pia mater.—*Trans.*

CHAPTER II.

PATHOLOGY AND THERAPEUTICS OF INSANITY.

A. IDIOPATHIC INSANITY.*

SECTION 1.—*Introduction.*

IT is not my purpose exhaustively to explain how we are to deal with the insane, or how the psychical treatment can be most effectually directed; a sound understanding and knowledge of men are, in this as a rule, better guides than many regulations and examples which can only rarely be applied to special cases. I may, however, give to those practitioners of medicine who have not had opportunity to thoroughly ground themselves in an institution for the insane, in this difficult part of the science of medicine, some short and suitable instructions which may be of practical utility and may serve as a safe basis for treatment. I hope thus to help in preventing, an inappropriate or injudicious medical interference in those cases where the prospect of recovery is still of the best, the favourable epoch being neglected, and then the disease either assuming a chronic course, or every prospect of recovery being lost.

SECTION 2.—*Different Forms and Classification of Insanity.*

In order to be able to sketch in short and definite lineaments, a picture of the rational treatment of insanity, I must first premise some axioms on the nature of this disease, on its immediate causes, and on its different forms. In this concise survey, I cannot enter into a deeper proof of many propositions; I will only communicate the result of many years' experience, and of a large number of sections.

It is evident that the brain, as the organ through which the higher intellectual powers are immediately manifested, must especially suffer in insanity, and confusion of intellect. We should, however, be much in error, in seeking, with many authors, the proper source and cause of the disease always in the brain. For this stands, indeed, in the closest relation with the rest of the body, and the influence which many organs exercise on the brain, is evident enough; I need only mention that disturbance of digestion, or a copious meal, may call forth a feeling of discomfort, of heaviness, and depression of thought.

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* With some omissions this chapter is taken unaltered from the *Tydschrift der Ned. Maatschappy tot bevordering der Geneeskunde.* 3 Jaarg, 1852.—EDITOR.

We are accustomed to compare the different kinds of intellectual confusion according to the differences of the phenomena which they call forth, and to note them down as mania, monomania, melancholia, dementia, and idiotism. This classification certainly serves to distinguish the different forms, and deserves to be retained; however, it has not always appeared to me to be quite practical, because it proceeds more from the morbid symptoms than from the nature and origin of the disease. For some years, I have therefore reduced the different forms of the disease to two principal groups, which may be designated as idiopathic and sympathetic insanity, which are distinguished from one another by special characteristics, and which serve all considerations in a therapeutical point of view.

In idiopathic insanity the brain suffers primarily; it may have for its origin, unusual mental exertion and over-excitement of the brain, or may have been occasioned by some violent influence, such as a fall, a shock, or by a certain tendency, and not unfrequently by an hereditary predisposition.

Sympathetic insanity exists, when the brain suffers only secondarily, and the exciting cause lies in other parts of the body, especially in the abdomen, or in the sexual apparatus. By long continuance, idiopathic insanity may proceed therefrom; recovery may not occur, unless the remote causes have been got rid of. Hence results the great practical utility of this classification.

SECTION 3.—*Symptoms of Idiopathic Insanity in General.*

The symptoms occurring in idiopathic mania best characterise this form of insanity.

In the beginning of the disease an excited condition only is manifested, an irritation of the cortical substance, wherewith an accelerated circulation in the brain appears to be connected. The pulse is generally more frequent, not rarely also hard and full, the face in most cases is redder than normal, the eyes sparkling; there is also an unusual mobility, a certain precipitation in all actions, and in consequence of this agitation, the decided feeling of health, so that the patient declares he is healthier, brisker, and stronger than ever before, and imagines himself capable of enduring the greatest hardships without difficulty. By the continued excitement of the brain, and the liveliness thus maintained, sleep is often interrupted, or is completely absent, or the patient believes that he no longer requires any sleep. This excitement, the rapid current of thought, the restless occupation, the inflamed fancy, convince him that he is able to accomplish much more than he formerly could, that he is capable of more than other men, that he—*is more.* Thus he feels himself standing higher, more intelligent, richer, or even more powerful; the understanding is no longer able to govern the impetuous, ever-swelling, stream of ideas and images, the most extravagant plans and schemes break forth, millions and kingdoms are gambled with. We have now to do with a prince or with an emperor who governs the whole earth.*

In the beginning of the disease, which often advances only very slowly, and almost imperceptibly, the change is not always perceived, even by the inmates of the house and the relations. One observes, indeed, a greater vivacity, and rejoices in the assurance of perfect good health, nevertheless, the greater irritability, and the passion on being contradicted, not rarely, in an unpleasant way, disturb the peace of the family. Moreover, in the beginning, the patient generally knows how to govern himself towards strangers, so that other persons notice nothing about him. In the further advanced state of the disease, their eyes must certainly be opened by the crazed plans, the senseless buying and squandering, the unbecoming haughtiness and self-esteem.

Such excitement of the brain does not, however, remain without influence on the rest of the body. The medulla oblongata gradually attains increased activity, and its sensibility is excited; but this spreads hence to other organs, especially the intestinal canal. Thence a livelier sensation of hunger and a powerful digestion, which not unfrequently reaches to gluttony, with which may be combined an inclination to drinking of wine, or especially spirits. As the sexual functions stand in close relation with the medulla oblongata, these are also drawn into the general agitation, and in such conditions sexual excesses occur often enough.†

If the disease proceeds further, and does not, through immoderate irritation of the brain and through meningitis, pass into fury, there follows on the acute, a more chronic stage, in which the great vivacity is again moderated, as the grey cortical layer more and more degenerates and alters. Ebullitions of passion appear only occasionally, or they cease entirely. The ideas become more and more confused; at last the unhappy patients fall into silliness, and therewith often occur paralytic symptoms, which point to an effusion of serum in the brain. Lastly, repeated apoplectic attacks occur until at length a more violent attack of the kind terminates the sad life of the sufferer.

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* From these phenomena we may, in my opinion, plainly conclude that our higher principle, our intellectual faculties, our judgment, must not be, if I may so express myself, identified with the operations of the brain, with the power of the brain. If our understanding, our judgment, resulted from the operations of the brain, without anything further, then indeed, such patients, by the prevailing excitement of the brain, must become more intelligent; their judgment must be sharper and deeper, in a word, their intellectual powers must be elevated. But the very opposite occurs. The current of thought is certainly more rapid, on account of stronger excitement of the organ, but the understanding itself does not appear in a higher degree; the patient is no longer in a position to govern the involuntary crowd of thoughts, and his understanding is carried away with them. The organ alone acts more vigorously; but the organ, therefore, and its operations, do not yet constitute our individuality, our higher principle. It is also worthy of observation that such madmen feel themselves in a more lofty position, mightier, richer, or even claim divine attributes. But none has ever presented himself to me who has boasted of his greater integrity, or of his higher virtue. They think themselves gods only because they consider that they are more mighty, and they are, perhaps, pretty free with threats of thunder and lightning.

† Insane patients affected with syphilis have often come under my treatment. The physician must remember this, since the insane do not always state it. I shall speak further on of onanism as an exciting cause. Here let it suffice to observe that, also, in idiopathic mania, this vice is often practised to the great injury of the patient.

That the bodily constitution, the sex, the age, are modifying circumstances, is quite apparent. However, haughtiness, in its various forms, lies constantly at the foundation; only it is not to be regarded as the occasioning cause of insanity, as has been often assumed, but it points out already the commencement of disease proceeding from the brain, and it belongs to the earliest and most constant symptoms. Moreover, cases occur (and probably the affection has then not extended equally severely over the brain, or it progresses slowly, and does not reach a high degree) in which the insane person goes astray only in regard to some points, or even only on a single point, and on the other hand speaks quite sensibly on every other thing—a condition which in many respects has a similarity with melancholy, only the patient is not cast down or sorrowful.* This form of disease is generally of long duration and difficult of cure.

In men, where the vascular system is more powerfully developed and in general disposed to inflammation, idiopathic mania is much more frequent than in women. It is surprising how long a woman may sometimes suffer from violent mania without the excitement passing into so severe a meningitis that paralytic mania and dementia follow upon it. I have observed cases where women had been for years in a state of madness, and yet were cured.† In men this happens more rarely, and such a course of the disease is in them more dangerous.

But not every insanity which is combined with great excitement or even with fury, is therefore to be considered of the idiopathic form. In very irritable and sensitive individuals especially in women and girls, also indeed in puerperal mania, we meet with cases, where the brain becomes powerfully excited by a remote cause, but this excitement proceeds not so much from the vascular system, being rather produced by violent irritation of the nervous system, especially in hysterical dispositions. Then even fury may be present, with most of the symptoms of idiopathic mania, but haughtiness and self-boasting are either entirely absent or only transient. The watchful physician will then be able to discover the exciting cause generally in the uterus, or in other remote parts which in a reflex manner, by acting on the brain, called forth this state of over-excitement. Such cases are easily led to recovery when the cause is removed, and the excited state calmed.

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* As in sympathetic mania or melancholy, as I shall further on develop, the secondarily-occurring brain irritation is not so violent, and generally takes also a slower course, while the patient can speak quite rationally on other subjects; we may well assume that in idiopathic mania, various degrees of brain irritation and affection occur, and among them also those in which the regular train of thought is not entirely destroyed. There is then generally only delusion with a ruling idea, but without that depressing influence on the spirit out of which the melancholic tone arises, and which proceeds from the action of the *sympathetic* and its abdominal portion, on the brain. So cases may happen where it is difficult to decide whether the insanity is idiopathic or sympathetic, especially as the idiopathic brain affection not rarely again exercises a marked influence on the abdominal viscera. Happily this distinction in such cases has no essential influence on the mode of treatment, as I shall show further on.

† In one woman the agitation and insanity had lasted no less than seven years, and during the first six years she had mostly lain unclothed upon straw. She was then received into the Utrecht Institution for the Insane; under better treatment she slowly became composed and in less than three years there, was quite restored. During a period of nine years, she then enjoyed the best of health, without her intellectual powers having sustained any damage by the long enduring insanity. Unfortunately she again became insane, and she has been for six years more in the Institution without success having followed the attempts to calm her excitement.

SECTION 4.—*Symptoms of Sympathetic Insanity in general.*

Sympathetic insanity, especially if it occurs in the form of melancholy, gives symptoms quite different from the idiopathic.

In general, we observe here much less agitation; on the contrary, the patients are mostly still, depressed, sorrowful; neither have they such confused ideas, but speak and judge quite correctly on everything, only they are governed by the fancy that they are unhappy—indeed, that they belong to the most unhappy of all men. For they regard themselves as the cause of their unhappiness, and fall into the most horrible anxiety, which is combined with a feeling of oppression in the præcordia, in the region of the stomach, and of the transverse colon, which they confound with anxiety of conscience. They fly from men, like to conceal themselves in a dark corner, and in all their actions, in their demeanour, in their expression of countenance, one perceives the deepest sadness, and a depression of spirit which not unfrequently leads to complete despair, and allows thoughts of suicide to arise.

The brain is in less lively action. The patient is, indeed, incessantly sunk in his sad thoughts, and therefore generally in no excited condition. Instead of the sparkling brilliant eye, we have a dejected look. Sometimes a congestion to the head happens, but only in a moderate degree; and if the head appears somewhat warmer, and the carotids pulsate somewhat stronger, yet the hands and feet generally feel cool, and the radial pulse is small and contracted, so that it gives evidence of an unequal circulation. There is rather a chronic or more passive congestion. The tip of the nose has generally a red colouring, but even the ears show a similar hue, according as the congestion more particularly affects the anterior parts of the brain or the medulla oblongata.

Here occur principally affections of more distant parts, in the abdomen or in the chest, in the digestive apparatus or in the sexual parts, which have usually for some length of time preceded the outburst of the mania or melancholy. With some watchfulness we may through this, generally settle whether we have to do with idiopathic or with sympathetic insanity. Yet the sympathetic insanity as I shall further on show, not rarely passes into the idiopathic form, through the disturbances and alterations which it calls forth in the brain; whether by the melancholic ideas entirely ceasing, and an entirely opposite condition of excitement occurring, or by passing into dementia, the general issue of all local brain affections leading to degeneration.

I shall speak more fully of sympathetic insanity, when I come to its special treatment; here I can only bring forward some characteristics by which the sympathetic and the idiopathic forms of the disease may be distinguished from one another.

SECTION 5.—*Acute Idiopathic Mania.*

In idiopathic mania, we have to distinguish in reference to its course, an acute and a chronic form.

Acute idiopathic mania is characterised by greater intensity and a shorter duration. The acute course occurs especially in strong and young individuals. The symptoms of irritation of the brain and of meningitis then appear more strongly marked, the confusion of intellect is greater and more extended, the fury in the attacks of raving is more violent; the pulse is not unfrequently full and hard, the head hot and the countenance is often strongly reddened, and generally rather swollen; the conjunctiva is often injected, the eyes quite glistening and the pupil mostly small and contracted; the patient is in continual motion, he can just as little sit still as any one in a violent fit of anger or rage, and he often displays therewith an extraordinary amount of muscular power; the insane ideas of greatness, might, and riches, transcend all limits, and with this violent cerebral irritation, not rarely complete sleeplessness occurs;* the sexual impulse is generally increased. The appetite is usually very good, so that the patient is immoderate in a high degree as regards food, and also as to wine and spirits, if he can have them. The bowels are usually sluggish.

Increased tendency to this form of disease, is usually to be sought in hereditary state, in a sanguine easily excitable temperament, and in mobility of spirit. As exciting causes, all those influences which strongly stimulate the brain are powerful; external injuries, insolation,† intense or enduring intellectual exertion, violent affections of the feelings, abuse of spirits, or of other poisons which are taken up by the blood.

In the beginning of the disease the prognosis is not altogether unfavourable if the patient can be placed under judicious medical treatment. But great prudence is necessary, because in the beginning relapses are apt to occur, which very easily pass into the chronic form, or even progress with the most violent symptoms of meningitis, and end with apoplexy or paralysis. Here very much depends upon the first month (or at most the first two or three months); after a longer duration we have to deal with the chronic form. In some cases I have seen patients succumb to violent meningitis within this space of time; the section then showed copious effusion of a plastic serum, considerable filling of the vessels, deep colouring of the grey cortex, even a bright red, more or less speckled, appearance of the medullary substance.

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* The physician must be always regardful of this sleeplessness. Its presence always proves a powerful irritation of the brain, and it would be very wrong in such cases to interfere with opiates, through which the congestion and determination of blood to the brain would only be increased. It is true that opiates may be quite suitable in other cases, which will be considered further on.

† This cause acts very frequently in hot countries, and thence it arises that individuals who have been taken ill in the East or West Indies, or on the return voyage to their native land, are generally incurable on their arrival in Europe. They had been exposed in those countries to a greater heat, through which the disease developed itself more intensely, especially if the strong heat of the sun acted on the uncovered head, and on the other side in such cases the first stage of the disease in which recovery is possible has already gone by, and through the violence of the disease, incurable organic changes have taken place in the brain.

Of course in this acute form, the state of iritation of the membranes of the brain, may pass into a high degree of inflammation. That depends in great measure on the constitution and age of the patient, or also on the causes giving rise to the irritation of the brain, and the physician must direct his treatment accordingly. I have indeed previously pointed out the mischief which a too copious or not-indicated evacuation of blood may induce, but have not intended to assert that bleeding is never to be employed in this disease. It may be even imperatively demanded. In robust constitutions, if irritation of the brain and meningitis can be recognised by distinct signs, if the pulse is full, hard, and frequent, and the patient is excited, we must repeatedly resort to the lancet. Meanwhile we must not forget that here we have not to do with an equally excitable and vascular organ as in pericarditis or pneumonia, that is to say we must guard against abstracting at once a large quantity of blood.*

* The disadvantage of such a proceeding will be seen, when the anatomical relations are taken into consideration. The brain and spinal cord are enclosed in bony capsules which cannot extend, but also cannot become smaller; nature sought to maintain as nearly as possible under an equal pressure, the precious organs included in these cavities. If too much blood tends to flow out, a kind of vacuum must arise, if the empty space forming is not again filled by something. The blood will, therefore, in a certain degree, be retained by suction, and although the assertion on many sides maintained that the brain does not become anæmic by great hæmorrhage, is not thoroughly proved, yet, this much is certain, that the brain does not become anæmic as quickly as other organs. If, in consequence of copious loss of blood, the pressure is considerably diminished, the cavity of that bony capsule acts equally absorbent: the transudation out of the vessels increases, and the cerebro-spinal fluid becomes more copious, corresponding to the transient increase of the cerebro-spinal fluid a diminution of the blood is seen in the vessels of the brain. In addition to this no other part of the body possesses such numerous interwoven networks of thin-walled and distensible veins as the spinal canal, and these must then become distended, and partly fill the vacuum occurring through copious loss of blood. In this manner the circulation in the brain becomes more sluggish than is endurable in the normal conditions of this important organ. With this sluggish circulation, the brain no longer experiences the requisite stimulation, the meningitis is not removed but passes into a chronic, more passive form, and thus by copious evacuation of blood we promote the transition into dementia. Therefore, Pinel emphatically warns against it, and later writers confirm his experience. In this respect one must remember what I have before developed, namely, that the blood circulates very quickly through the cortical layer, because the vessels entering it have only a very short course. Lessened rapidity of the circulation in the brain is therefore especially injurious. Thence also it arises, that blood charged with carbonic acid in the brain and medulla oblongata almost instantaneously produces symptoms of suffocation.

If the brain is in a very excited and sensitive condition, the altering of the circulation by copious venæsection may induce a new excitement, of which Pinel has already quoted examples; to these I could also add some instances. After bleeding a fresh maniacal attack occurred. How sensitive the brain is to copious loss of blood, we see from the circumstance, that bleeding is not rarely followed by a swoon-like condition, as well as by convulsions which accompany it.

The physician must here regard the general state of the vascular system and the pulse, and not merely keep in view the excitement or the fury of the patient.*

If the vascular system is not very full, it is far preferable to apply a couple of cupping glasses with the scarificator to the neck; from this I have often seen a most excellent result. These cause a far more powerful derivation from the head than a venæsection, which exerts a general action, and is only suitable where cupping does not extend, namely to overcome a general reaction of the vascular system. Leeches may also be indicated; they are best applied, not behind the ears, but high in the neck, where they can act more on the branches of the vertebral artery. They have not, however, so powerful a derivative action as cupping, and the application of warm poultices to the neck, in order to maintain the bleeding, has a gentle warming effect, which again lessens the derivation caused by the leeches. The use of leeches is also often difficult, on account of the longer duration of the bleeding, and because it is troublesome to apply them to a turbulent patient. Leeches have also been applied to the temples, and in order to derive directly from the brain, they may be applied on the forehead, in the region of the frontal artery, or near the eyes.

I have, however, several times seen erysipelas arise from leeching the temporal region, through irritation of the sensitive skin, and the swelling and congestion attending it outweighed by their injurious influence, the advantage obtained by the extraction of blood. Leeches in the nostrils certainly derive very powerfully from the brain, but they will not be easily applied there in a very excited furious insane patient. We may, therefore, most safely always choose the neck high up. But cupping, repeated according to circumstances, certainly deserves the preference.

As a matter of course, also continuous cold applications to the head are indicated; or, according to circumstances, ice, douches, drip, or shower-baths to the head, or even together, with the influence of cold to the head, simultaneously warm general baths or foot-baths.* Leaven may also be useful. Vesicatories, on the other hand, require some prudence. If the patient is very agitated and irritable, then the stimulation and pain from the Spanish fly may cause mischief, because the whole organism becomes too highly excited; instead of calming, they bring the already active fancy of the patient only still more into uproar.†

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* Increased temperature of the forehead and vertex are to be especially regarded. If at the same time the hands are cool, venæsection is only rarely proper, rather is it injurious; on the contrary, if they are warm and the pulse is full, it may be useful, or may even be cogently required. In mania, certainly, hypertrophy of the heart only seldom occurs, for this rather causes apoplexy; however, the physician must not forget its possibility.

Every physician knows that quiet is necessary, and all sources of irritation must be kept away; among these are to be reckoned especially the presence of many relations and friends,‡ too frequent addressing, and too strong light. Among entire strangers, and in the absence of all blood relations, the patients are generally more quiet, and are easier managed. Contradiction and persuasion against their ideas they endure all the less from those belonging to them, in proportion as these were previously in submission, and the less they might expect contradiction from them. Thus, domestics whom the patient was formerly accustomed to give orders to, are often prejudicial in this way, as he cannot bear to be obstructed by them in carrying out his will.

The employment of internal remedies, such, namely, as act on the intestinal canal, and which by judicious application may be so useful, must not be carried too far. Drastic and acrid drugs irritate the intestinal canal too strongly, they induce copious watery stools and spasms in the bowels, and rather induce excitement than calm. If the bowels are sluggish as is very frequent in such cases, a decoction of senna leaves with tamarinds, to which may be added some neutral salt and one or two grains of tartar emetic, is suitable. If this causes copious watery stools, the mixture is to be taken less frequently or discontinued entirely. If great excitement still continues, then it is better to give only the antimony with sugar in form of powder, or when there is much vascular action, with nitre, especially when the appetite of the patient, as is usually the case, is much increased. Moreover, if nitre is given for some length of time in this combination it not unfrequently causes disturbance of the stomach, for which reason I am accustomed in such cases to give the tartar emetic by itself. Many physicians have the erroneous idea that the antimony in these cases induces an irritated condition of the stomach and thus acts as a derivative. If it is given in such doses as to cause continual nausea or vomiting, then the powerful remedy assists much less in diminishing the cerebral irritation than if the stomach had not been affected in such a manner. The great vivacity and excitement are best quieted by it, when it is conveyed into the body in the largest doses without vomiting or diarrhœa occurring.* That depends on the form in which the remedy is given, on chance combination with other medicines, which influence the movements of the intestines, as well as on the time of its being taken.

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* With the foot-bath one has to be careful that warm water is constantly added; for the water cools more quickly than the feet, heated by the first impression; it is then no longer derivative, or one has at last even a relatively cold foot-bath, that is to say, the water of the bath has a lower temperature than the feet. The foot-bath must also not be continued too long, and its stimulating action may be increased by salt, mustard, and such substances. Simultaneously cold may be allowed to act on the head. Ice may easily be injurious by its weight and by pressure, if one does not prevent this disadvantage by special precautions.

† In one case where I was unable to keep the patient in his own dwelling, in bed and in his room, I resolved to blister the soles of the feet. In that way I attained my object, for the man was not able to stand on the resulting bladders which continued some days. However, I did not gain the confidence and friendship of the man by it, although the consequent derivation helped to calm him, and a cure was at last obtained.

‡ In one case a patient after his recovery related to me that nothing had caused him more anxiety than the shadows on a wall, which arose from persons whom he could never see, passing before a lighted lamp. These shadows he had taken for ghosts and devils.

As already stated I have found the form of powder with sugar the best, but frequently give it also in the form of pill. If the tartar emetic is given in watery solution, it more readily excites vomiting; in the dilution with water it is more quickly absorbed by the vessels, so that in a moment a larger quantity of the remedy circulates with the blood, where, as experiments with direct injection into the vessels of animals have taught, it rapidly induces vomiting by its action on the central nervous system, especially on the spinal marrow. The powder with sugar is taken into the stomach with less water, the solution is therefore more concentrated and thicker from the sugar dissolved in it, endosmosis follows more slowly, and vomiting does not come on so speedily. We can now without hindrance gradually raise the dose much higher than if the medicine is given in watery solution.† Perhaps it is from this that one sometimes sees no vomiting occur after very large doses. In two cases where by mistake, an insane patient had taken a drachm of tartar emetic at once, I observed neither nausea nor diarrhœa, indeed no symptom except a certain weakness. If one adds purgatives of any kind, the patient does not tolerate the medicine in nearly so large doses as if he takes it unmixed. If, on account of sluggishness of the bowels, one must sometimes give a laxative, and if a considerable action on the bowels does not at once occur then a decoction of the bark of Rhamnus frangula is most suitable.

* If nausea or vomiting occurs at the commencement, after which diarrhœa usually comes on, not only does the patient soon become weakened, but his intestine also becomes so sensitive that he can only bear small doses of tartar emetic which are useless. The restlessness and dissatisfaction of the patient, have then generally appeared to me to increase. Through imprudence we have then lost a very effectual means of calming him. It is known also that this remedy has the power of considerably depressing the vascular action and the inflammation in peripneumonia, without its inducing vomiting or diarrhœa. In a case of violent local pachymeningitis, which extended to the pia mater and was attended with intense headache, the patient had vomiting from the tartar emetic. I was with him directly, and instead of the strong and full pulse of active cerebral congestion I felt the pulse weak. During the vomiting the headache had become much lessened, moreover, this patient ultimately quite recovered.

† I am accustomed to begin with small doses, from ¼ to ⅓ of a grain at a dose, which I repeat several times in the day. In acute mania one may immediately begin with larger quantities, and the remedy is then also better borne. By the simultaneous use of acids, *e. g.*, in the form of lemonade, salad, and so forth, nausea and vomiting come on much sooner.

Vomiting also occurs more readily if the tartar emetic is taken fasting. I therefore generally give it after breakfast, after dinner, and in the evening before going to bed, but meanwhile I always give a bit of biscuit. By this method one can more easily increase the dose, and this causes a continuation of the peculiar quieting or depressing effect on the brain, so that the patient becomes calmer and clearer, and under these favourable changes, often progresses rapidly towards a recovery.

In many cases, yet on the whole more rarely in idiopathic mania, the tartar emetic is not tolerated, but immediately causes nausea and vomiting, or diarrhœa. The intestinal canal is then in a state of erethism, and we must first endeavour to lessen this sensibility by an emulsion or by other calming measures, as to continue the tartar emetic without other treatment, would only do mischief.

An insane person will often take no medicine at all, because he considers himself quite well. The tartar emetic may then be added to his food or drink; but this requires especial prudence. If we have begun with too strong a dose, the patient perhaps observes it from the nausea coming on, or he may even taste it, when it is added to his drinking water; he then becomes suspicious and distrustful, thinks that all his food and drink are poisoned, and will take no more at all, especially if by long use of the medicine he should have lost his appetite. However, the refusal of food, occurs more in sympathetic mania.

If great desire for food existed before, this is reduced more and more by the use of tartar emetic. Only the remedy must not be so long continued that the appetite is entirely lost.

If the insane person improves under this treatment, then his tolerance of the tartar emetic diminishes, and he can no longer bear, without nausea or vomiting, the large doses which he took every day during the earlier excitement, and apparently without especial effect. Accordingly, the rule is as follows:—At the commencement of the disease we increase the dose every second day, or even daily, until an indication of nausea occurs, and then we keep at the same dose. If in the further course the patient becomes more calm, if lucid intervals occur, which are usually interrupted by repeated accessions of greater vivacity, although the disease gradually diminishes, the dose of tartar emetic must be lessened in the same proportion as the patient becomes more sensitive to the remedy.

Calomel with jalap root, from which in the cerebral inflammation of children we often see so admirable an effect, I have not, as a rule, employed in mania. The brain affection here does not yield so quickly as in children, we must give the remedy longer time, and I have seen the salivation which sometimes occurs, attended by an increase of the congestion. The less favourable action of this medicine induces besides a cachetic condition and a sinking of the patient.

In convalescence we must be careful that the patient is not exposed to the influence of social intercourse. He always retains for some length of time a certain excitability, and from neglect of the prudence necessary in this respect, I have several times seen an incurable relapse occur. Daily walking in places not much frequented is advisable; on the other hand, for some length of time, gay society, coffee houses, music, and everything which can excite vividly must be avoided.

In the acute stage of idiopathic mania, when the patient is much excited, and considerable irritation of the brain is present, all narcotics must be avoided. In a few cases indeed, from digitalis, especially when given in infusion, I have seen calmness come on, in proportion as the pulse was depressed by the remedy; but, on its discontinuance, although it had been given for a long time, generally a new attack occurred as the pulse again rose. In general, digitalis appeared to me to be only a palliative remedy. If we succeed in quieting a patient by tartar emetic, he is generally on his way to recovery. But we cannot say that of digitalis. From opium and morphia, I have generally seen only injurious effects in that excitement of the vascular system; either obtuseness, or else an increased restlessless came on. In other forms of insanity, where rather the feeling is excited without great tumult of the vascular system appearing, especially in sympathetic mania, it may indeed be very advantageous in its action.

SECTION 6.—*Chronic Idiopathic Mania.*

We do not always succeed in curing acute mania on its first appearance. The physician may be called only after an injudicious treatment has preceded, or nothing whatever has been employed, and the time most favourable to recovery has passed away. Often however the most active treatment on the first occurrence of the disease is not able to ward off the consequence of meningitis and inflammation of the cortical substance. In all these cases, if the patient does not succumb with the symptoms of acute inflammation of the brain, the disease passes with more or less unfavourable conditions into the chronic stage.

The severity of the disease now diminishes, the raving is lessened, and the attacks of strong excitement occur more rarely; but in place of the former changing delirium in which nearly every day new ideas and plans sprung up, one definite conception has arisen. Instead of the former violent and passionate behaviour, the patients often show more the character of foolishness, they are quiet, and a general craziness in their conceptions is more and more manifested. In other cases the greater vivacity still comes on by turns, while the patient becomes governed entirely by one idea (monomania). Not uncommonly hallucinations are developed therewith, especially in the organ of hearing (which makes the prognosis very unfavourable), and the patient then constantly hears voices by which he is pursued, or he thinks he hears cursing and blaspheming, or as a prophet he receives inspiration from God, and such like. With numerous individual differences, through sex, education, station, early bringing up, and occupation, nevertheless in chronic idiopathic mania pride may be recognised as the key-note, wherewith only the symptoms take a slower course. Now also the patient allows himself to be governed by certain ideas, often quite in contradiction with his own advantage, which he cannot repress, and all rational persuasion by which he should be made conscious of the perverseness or folly of his delusions has generally only the consequence that he seeks new grounds on which he may defend his delusion, and that instead of becoming convinced, as a rule he only goes further in this fancy.* If one alludes to this dominating idea as little as possible, and leads the patient away from it, whilst one turns his activity to other objects, especially, if the patient is qualified for it, work or occupation can contribute its share; thus one helps in the most effectual way to recovery, and most safely procures the quieting of the mind, in opposition to the often-occurring confused ideas.

Now more and more the signs of chronic congestion or of meningitis appear in the countenance; it has no longer a uniform deep colour, but the tip of the nose is mostly darker, and in a higher grade of chronic inflammation, the region above the eyebrows takes part in this darker colour (p. 34). Generally the region of the vertex feels hotter, and indeed also the forehead or the back of the head, whilst always in proportion to the more or less chronic course, the hands and feet are cool, at the same time the hands also appear somewhat swollen and bluish. If one presses between the back of the head and the first vertebra, the patient very often feels an unpleasant oppressive pain in the head; this phenomena indicates an irritation and overfilling with blood of the medulla oblongata, which usually diminishes or even entirely disappears by cupping the neck. Frequently the ears are seen reddened, which appears to proceed from congestion at the base of the skull and in the vertebral arteries.

The patient is frequently subject to an insatiable hunger especially if in the early period he has had no medical treatment at all, or only that of an injudicious character. However much food he swallows, he generally digests it quickly, and only seldom suffers from indigestion, which is the more surprising as the bowels are usually sluggish and the prudent use of laxatives and aperients is required. If one withdraws the food from the patient and puts him on a spare diet, he gets quarrelsome, unquiet, morose; by a continuation of this withdrawal he becomes weaker and cachectic, or mortification of the toes occurs, especially in winter time.* I have once seen, in a young man with acute mania, this gangrene occur critically, so that upon its onset the insanity soon vanished; care was taken as to sufficient food but he lost the ungual phalanges of two toes.

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* These patients often know very well how to help themselves when captious questions are put. A coachman assured me that he was the true God. Thereupon I soon asked him where he was born, and what vocation he followed, and these questions he answered quite properly. I now said to him that I could not understand how he, as the true God, had brought himself to no farther than a coachman. His answer was, that he existed certainly before Adam; that Jesus also was born in a little village, and that his father had been a carpenter.

In the further course of the disease, especially if it goes badly, signs of paralysis come on. Then one often finds the pupils unequal, and possibly a slight apoplectic attack may have passed unnoticed; but both eyes still see well. This inequality of the pupils may have existed even earlier; perhaps may have been congenital, and then signifies nothing. But if it stands in relation with the insanity, it then belongs to the most unfavourable appearances, and we may expect apoplexy. It then generally indicates incurability, although I have observed recovery in a few cases.

Sometimes the pupils are much contracted—only as large as a pin's head—which is always to be regarded as a sign of great irritation of the brain.† To this may also be added an impediment in speaking. It begins with a twitching at the angle of the mouth, then the patient can pronounce the first word only with trouble and afterwards the stammering gets worse. Recovery in such patients only rarely occurs.

The prognosis in chronic idiopathic mania must naturally be unfavourable. But it is the more unfavourable, the more actively the first stage came on, the more there were signs of previously occurring meningitis, the stronger the constitution was, the more readily the vascular system becomes set in abnormal activity, on which account it is also more unfavourable in the male sex. With long duration of insanity, the prospect of recovery decreases in a corresponding rate. In old age, over 60 or 70 years, the disease is usually incurable, especially in men.‡

In the more chronic form general bleedings are no longer indicated; an apoplectic attack may still demand a venæsection; collapse readily occurs after it, or the patient sinks into a state of imbecility. If the congestion of the brain continues, as is generally the case, and if it manifests itself by the above-named head symptoms, by reddening of the nose and ears, and increasing confusion of intellect, or even stupefaction, then cupping, with the scarificator, to the neck is indicated, or failing that, leeches. Through this in a few days the patient generally gets clearer in the head, but easily relapses into his previous state, so that the same remedy may be indicated, but in combination with the previously-recommended external means, namely, cold applications to the head, general baths, footbaths, &c. Then, especially, powerful derivative measures are suitable, blisters to the neck, or even a seton, which generally acts more powerfully. Many recommend Autenrieth's ointment, which I have also frequently employed with good effect. But the patients sometimes displace their bandage, soil their fingers with the ointment, and then apply them to their eyes, which may of course be followed by injurious consequences. Moreover, it has also happened that this painful remedy acts rather as an irritant than a derivative, and on that account I have of late years no longer employed it. The condition of the patient sometimes demands the placing an issue in the calves of the legs, and I have observed that the recovering patient, if he imprudently discontinued the issue, suffered a relapse, which on re-establishment of the issue was again relieved.*

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* During my earlier appointment in the Amsterdam hospital, where the diet often still left much to be desired, likewise also during the first period at Utrecht, where, when the medical inspection was transferred to me, the institution for the insane was yet in a deplorable condition, I several times met with Pott's disease; with better direction of the dieting this has occurred no more. Even Pinel makes mention of the great mortality, the frequent relapses, the greater excitement of the insane, the fatal diarrhœas and dysenteries which appeared when the quantity of food in the establishments for the insane was too much reduced.

† As is known, the oculo-motorius causes the contraction of the pupil, and irritation of the sympathetic—*e.g.*, through worms, is followed by a dilatation; but this also occurs in compression of the brain. I have also observed a change of colour of the iris, often in a high degree, and this is for the most part a sign of incurability. I also frequently saw this alteration of colour increase and decrease, according to the degree of insanity. In sections of such individuals I found, as a rule, marks of violent inflammation in the brain.

‡ According to the Report of the Dutch Institutions for the Insane appearing in the year 1848, which extended over five years, 2,142 individuals were treated, and of the patients over 70 years of age no man was cured, but, on the other hand, 17 women. In the report for the years 1849 and 1850, then first occur two cases where men above 70 years were cured.

We should further seek to remove the complications, and to allay the still violent irritation of the brain and the consequences of the earlier acute stage. For this purpose even now, the tartar emetic is indicated in the first rank, in its employment the previously-stated prudential measures are not to be disregarded. Such large doses can rarely now be given as at an earlier stage, but neither are they required. As in this chronic form a continued patience and perseverance are called into requisition, we must not give the remedy in doses large enough to irritate the intestine too much. Some patients bear throughout even large doses well, and a steady employment of it often leads to a fortunate issue. In other cases, however, the continued use of this remedy causes loss of appetite, or the patient continually suffers from nausea or diarrhœa, begins to emaciate, assumes a cachectic appearance, and furuncles occur at one place or another, or an eruption breaks out on the lips. It is then high time to stop the tartar emetic. But if the symptoms of the disease are very active, and if a remedy depressant to the activity of the brain is still required, then we have a noteworthy and only too-little-used remedy in the sulphate of copper. This likewise has a calming action, but in a lower degree, on the brain and nervous system, but through its astringent properties it acts yet more definitely as a tonic. By the use of the sulphate of copper I have nearly always seen the appetite return, and the patients, who during the antimonial treatment had emaciated and were inclining to a cachectic state, again become well nourished; even the intellectual confusion not rarely, completely disappeared through it. It is to be given in smaller doses than tartar emetic, for example, at first one-fifth of a grain several times a day, slowly increased, while we watch if pain in the stomach or nausea occur from it. In several cases I have been able to give large doses even for a considerable time without disadvantage; for it did not act on the bowels, and purge, which tartar emetic so readily does.* The remedy has only this drawback, that it cannot be well given except in the form of pill, since patients have an aversion to it on account of its unpleasant taste. In combination simply with liquorice juice it is taken without resistance.

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* A case of the kind occurred in the Utrecht institution. A man had formerly had an ulcerated leg, and otherwise was in health with it. After healing up of the leg, he sank into insanity, from which he was freed by issues in the calves of the legs. Later he allowed these issues to heal, and a relapse into insanity occurred, which yielded to the re-establishment of the issues.

In some cases where tartar emetic acts injuriously, and on account of its form the sulphate of copper cannot be employed, but the same indication continuing, I have tried the sulphate of zinc. This, also, does not act on the bowels, but it has a much less depressing effect on the excited brain, and I have accordingly seen only slight effect from it. To a patient who was too intolerant of tartar emetic, by the use of which the excitement diminished, the sulphate of zinc was given. She took two grains four times a day without nausea occurring; but the restlessness and excitement again increased, and at the same time the bowels became more sluggish, so that laxatives were required. The sulphate of copper was now given, the excitement again diminished, and the patient was cured. In another case I gave the sulphate of zinc in doses of one grain four times a day for several weeks without effect; the bowels were sluggish, the tongue foul, but the excitement of the patient did not abate.

From ipecacuanha, I have seen the diarrhœa cease, but the restlessness and excitement of the patients increased at the same time.

To many patients in this chronic condition, on account of the continuing excitement, the physician must perseveringly give such depressing remedies, whereby they then become really calmer, quieter, and more peaceful, and also yield less to the pangs of their erroneous ideas. But if the remedy is then discontinued, the previous vivacity and excitement again return. This sequence may be many times repeated even in the incurably insane. When the issue is unfavourable, the irritation and excitement of the brain at last abates, and the patients fall into dementia, or into such, on the whole, tolerable condition, that on account of their obedience, they are yet able to be occupied in a useful and effective manner in the institution. With many, this state of excitement occurs only now and then, especially in spring and autumn, and by use of the measures described, the former quiet condition generally soon returns.

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* In one case I gradually reached the quite unusual dose of thirteen grains of sulphate of copper three times a day. The patient took the remedy in this dose for a month, and recovery then occurred rapidly. But now within eight days the sensitiveness to this medicine increased in such a manner, that she could not take more than one-fifth of a grain without feeling nausea or pain in the stomach. The woman remained cured and well nourished, without any bad symptom from the medicine, appearing or remaining behind. This remedy is often confounded with the acetate of copper, which indeed belongs to the class of active poisons.

In the chronic stage, the patients often suffer from constipation and sluggish bowels, which, in my opinion, is connected with an affection of the spinal cord.* That sometimes requires the employment of powerful remedies, for example, the decoction of senna with tamarinds. I have of late freely employed a decoction of the bark of Rhamnus frangula† (1 oz. to 8 oz. mixed with a syrup, two tablespoonfuls three or four times a day). The watery extract of aloes also acts very well, best in the form of pills, and with the addition of tartar emetic. But as in this combination the latter easily induces vomiting, it must be added only in very small quantity. If the ext. aloës aquosum is given alone, without the tartar emetic, then, in order to obtain a continuing effect, after a time the dose must be increased, and this increase must be constantly carried further. But if, on the contrary, some tartar emetic is added, *e.g.*, 5 grains in sixty pills, of which two to four are to be taken four or five times a day, the excitability of the intestines gradually increases, so that the former doses are no longer borne, and the quantity must be continually diminished, until at last the remedy is no longer necessary. Many physicians give the ext. aloës aquosum only in the evening, or only morning and evening in larger doses; from this I have many times seen bad results. The aloës act especially on the colon, and here induces, as I shall show when speaking of sympathetic mania, spasmodic contractions. In consequence of this irritation, the hard masses are not allowed to pass away, and the bowels are, therefore, irregular, whilst watery evacuations and constipation alternate with one another. For sixty pills I employ 15 grains of extract of aloës, with some tartar emetic, and the necessary quantity of a bitter extract, and allow two or three pills to be taken four or five times a day. But this dose must sometimes be increased. On account of nausea readily occurring, the tartar emetic must often be still more reduced; the above-communicated cautions in regard to its use have their value here also.

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* The tendency to sluggishness of the bowels is also generally greater, if the phenomena of brain irritation increase. It can, therefore, be a consequence of idiopathic mania, as similarly on the other hand, sluggish bowels and tendency to constipation frequently lead to mania, and, doubtless, by reflex action on the spinal cord and brain. But from this we must assume, that the abnormal condition of the intestine, if it has had its origin in idiopathic mania, may on its side again react on the head. For this reason, in idiopathic mania, we must always pay attention to the bowels. In violent local myelitis, I have observed the most obstinate constipation. In chronic mania, we must, therefore, also regard the condition of the spinal cord. By cupping the affected region, the evacuation of the bowels may be promoted.

† The bark must not be taken from too small branches, else it may excite vomiting. The bark of Rhamnus cathartica, has more acrid principle, and causes pain in the bowels.

The tendency to watery stools, which alternate with constipation, is an extremely troublesome condition, often very difficult to remove. I have sometimes found the combination of watery extract of aloes and sulphate of copper very beneficial, which remedy may indeed be continued for months together in small doses. Rhubarb I employ only rarely, because it always leaves behind it constipation, and therefore is sometimes injurious.

In order to lessen the tendency to spasmodic contraction of the descending colon, we must sometimes add antispasmodics, *e.g.*, extract of belladonna. The activity of the extract of aloes is generally increased by this, so that we can give it in smaller doses. Also those substances which act especially on the spinal cord, as extract of nux vomica, sulphate of quinine, likewise watery extract of secale cornutum, increase the power of the extract of aloes, and in that way often act very well.

But I have always found the decoction of the bark of Rhamnus frangula most effectual; I therefore here strongly recommend it. It has the peculiarity of securing a solid evacuation without inducing griping or pain, and at the same time it has no nauseous taste. If a thickly coated tongue indicates a special irritation of the mucous membranes of the digestive apparatus, then a combination of extract of aloes and muriate of ammonia is suitable; by its use this appearance mostly vanishes within a few days. We must be careful here in the use of tartar emetic, it is generally decomposed by the sal-ammoniac, and we get a more powerfully-acting compound.

If the intestinal tube is in an irritated state, and the accumulated matter in the colon is dislodged with difficulty, then of course castor oil may render good service; only this remedy must not be brought into continuous use.*

If a patient refuses all medicine, and one perceives that the intellectual confusion and excitement are constantly increasing, in consequence of the sluggish bowels, then the croton oil can sometimes afford help, if we give one-sixth or one-half a drop, or even more, in the form of powder added to the food. Frictions of the abdomen can of themselves promote the peristaltic movement of the intestines; on the other hand, I have seen no particular effect from rubbing in croton oil over the belly.

SECTION 7.—*Hallucinations.*

To the troublesome and disturbing phenomena of the chronic stage belong hallucinations, or imaginations of the senses, which

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* If the bowels are inert, and obstinate constipation exists, we must not always have recourse to strong drastic remedies, which by continuous use only become more ineffectual. I have seen cases where quite extraordinary doses had been attained without effect, and after some leeches had been applied to the anus, neutral salts produced a copious evacuation, which the strongest remedies had before failed to cause.

I have above already briefly considered. They vary ever according to the different organs of sense, whose condition of action suffers a disturbance in the nerves, and especially in the central places of perception. They are not excluded in sympathetic mania, but they especially accompany idiopathic mania, and they are here of very peculiar significance; for the most part they indicate a deep irremovable lesion and alteration of the brain, induced by wide extension of meningitis into the depths and the ventricles of the brain, which almost always gives rise to paralytic phenomena. All hallucinations are not equally significant. Hallucinations of vision, in which the patient has erroneous delineations of persons and spirits do not occur very frequently. They are often caused merely by congestions of the optic nerves, or of the corpora quadrigemina, and then they disappear after cupping the back of the neck, or after other derivative measures. Doubtless they may also be connected with deeper penetrating, and no longer removable, alterations. In general, I have seen the hallucinations of sight disappear readily. Not to be so lightly considered, are the hallucinations of feeling, if we reckon therewith the well known sensations of startings and formication of the limbs, the usual symptoms of congestion of the medulla oblongata or the brain, or even the precursors of an apoplectic attack. Deceptions of feeling, in the face, point to an alteration in the trigeminus, and, as a rule, are of unfavourable import.

The most frequent are hallucinations of hearing, which are also the most troublesome, because they incessantly disquiet the patient, and maintain his false opinion; for in those noises he generally thinks he perceives the voices of persons and spirits who persecute him. We must not expect to convince him of the fanciful nature of the perception.* It is difficult to remove hallucinations of hearing. If the affection has not already existed too long, I have sometimes succeeded in removing it by derivative measures in the nape of the neck, such as cupping, issues, setons. These hallucinations sometimes occur in sympathetic mania, mostly in connection with congestion of the uterus and menstrual disturbances; they are then not so continuous, and are more easy of removal. I have generally found that those patients who believe they hear only a whispering, recover sooner than those who perceive distinctly pronounced words. The prognosis is the worse if these hallucinations are constant, and entirely without interruption. In many patients they are excited by other sounds, *e.g.*, they think that they hear voices in the singing of birds.

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* A highly educated woman who incessantly heard such voices, and who believed herself to be secretly followed by persons, I allowed to come into an open field, where no one could remain in concealment. I asked her if she still heard the voices here, and if she also believed there were persons here in concealment, or if she must not admit that it was a fancy or a dream in the waking state? For in a dream we often hear persons talk who are not present. Her answer was, she certainly could not specify where the persons heard by her were, but she was quite in her senses, and she could not disown her own perception and consciousness; there must therefore be persons or spirits who were concealed in the earth, or behind the clouds, and whom she heard too distinctly for her to be made to disbelieve it by others. A poor woman complained to me that she was continually persecuted by the devil, who let loose at her all sorts of blasphemies, and indeed all the worse the more she exerted herself not to attend to them, but often, also, when she was talking and active. She had already been to a clergyman, who should exorcise the devil, and who had judiciously directed the woman to me. I asked in which ear the devil always talked to her. She was surprised at the question, which she had never started for herself, but now recognised that it always occurred in the left ear. I explained to her that it was an affection of the ear, which now and then occurs, but she was doubtful; it was impossible to convince her, and all the remedies employed were ineffectual. This is, moreover, the only case with which I am acquainted where the hallucinations were confined to one ear. I know of a case where a man set his house on fire in order to drive out the concealed spirits which continually tormented him with their talking.

After many fruitless attempts to remove this troublesome symptom, I at last thought whether, perhaps, local congestion and pulsation of the smaller arteries might not be the cause of this hallucination; for in sections of such individuals, I had frequently recognised the presence of a chronic meningitis in the fourth ventricle. I therefore tried an infusion of digitalis, in order, if possible, to moderate the action of the arteries; and of all remedies this has rendered me the greatest service. Sometimes, through continued use of the digitalis, the hallucinations lessened, and at last ceased entirely. In a few cases the hallucinations returned when the remedy was discontinued, but even then in a different degree. Of course, in many cases, the digitalis has not been of any service at all. In general, however, it moderates the affection, and makes the condition of the patient more tolerable. In reference to this I will here mention one case only. A man 40 years of age, through abuse of spirits, suffered from mania with hallucinations of hearing, which indeed is not very uncommonly observed. He thought that he everywhere heard his friends, who must be concealed in the establishment. On account of his excitement and suffused face, he had tartar emetic in increasing doses; through this he became quieter, but the hallucinations did not cease. Some diminution of the hallucinations resulted from an issue in the neck, yet after an interval they constantly returned. I gave datura stramonium, which has been commended by many; but it produced no change. I now employed the infusion of digitalis, and continued it for a long time; through it the pulse fell to fifty beats, and the patient became very weak, but the hallucinations ceased. The digitalis was stopped, and the strength increased by other remedies, but the former annoying condition did not return. The man was so far improved that he could again enter into life, although his intellectual powers had not yet recovered their former degree of clearness.

Hallucinations also occur in the remaining senses. In general it is an unfavourable sign, if the patient thinks that he perceives a bad smell everywhere. The organ of taste may also be the seat of hallucinations, and there are patients who devour all sorts of rubbish and filthiness—even their own excrement. That is mostly an extremely unfavourable symptom, and indicates an incurable affection of the brain. Yet I have observed a few cases of recovery even in such patients.

Among the causes of hallucinations, must be mentioned everything which can increase congestion in the head; sluggish bowels, disturbances of menstruation, hæmorrhoids, abuse of spirits, and especially also onanism. I have often seen hallucinations once cured, again make their appearance from onanism. In one case, by moderating the cerebral congestion, I had quite removed the hallucinations, but after some time, during the convalescence, congestion of the brain was again established through a repetition of onanism, which, happily I was able, soon to put a stop to. The patient related to me that he had this time, in the same way as he formerly heard the voices, perceived a humming without its going further. I acted on the bowels, and depressed the vascular action, by which means this humming disappeared. The nose and ears, which were reddened during the attack, again assumed their natural colour.

SECTION 8.—*Hæmatoma of the Ear.*

In my experience this has occurred especially in idiopathic mania. Like other authors, I have also only observed it in men. Only a few observations support its occurrence in women likewise. The auricle swells to a thickness of an inch or an inch and a half, or even more; through this the part becomes quite misshapen. Sometimes both ears are affected. If the swelling is opened, blood flows out. Later, the auricle contracts more or less.

As to the prognosis, I know nothing definite to state. I have seen many patients recover in spite of the bloody tumour, and that even in cases where both ears were attacked. In others, and these were the greater number, incurable insanity already existed. I have not seen evil consequences from it.

The opening of the tumour is not always demanded, although when there is much tension it may be of great service, and I, at least, have seen no bad consequence from it: absorption gradually occurs without the swelling being opened; or by poulticing suppuration comes on and afterwards contraction.

The suspicion may easily arise that the swelling was the consequence of previous maltreatment. I have, however, observed one case where an insane patient made this accusation, but it was thoroughly unfounded. For afterwards, without any obvious cause, a similar swelling appeared in the other ear.

SECTION 9.—*Period of Recovery.*

If idiopathic mania has already passed into a chronic state, then recovery usually takes place only slowly. The excitement diminishes, the patient becomes quieter, and passes his nights better, persuasion and rational arguments sooner make an impression upon him, he is not so completely under the rule of his dominant idea, he can also again exert some attention in reading and in conversation, which was before not possible for him.* Lucid intervals occur more frequently, the patient is then conscious of the erroneousness of his former ideas. Improvement proceeds imperceptibly, the patient comes less prominently forward with his perverted ideas, and it is on the whole better not to allude to them, except when he himself begins upon them. Insanity has also sometimes vanished quite suddenly as if by a charm; but this occurs rather in sympathetic insanity, in which the brain suffers only secondarily.

However, the chronic stage of the disease does not always proceed in such a way that the condition of excitement decreases more and more under the treatment specified, and that health at the same time returns. Frequently enough the contrary changes occur. The patient becomes weaker, quieter, apathetic; the pulse is small, the hands cool, but the head always shows a higher temperature; the chronic active brain affection takes the character rather of a passive one, and the patient seems likely to fall into imbecility or dementia; sometimes the first commencement of paralysis is shown in speaking, and in a twitching of the corners of the mouth.† Under such circumstances the previous depressing treatment is no longer indicated; but we must still take great care to keep the bowels acting regularly, because constipation can even now act injuriously on the head, and therefore impede the perhaps still possible cure. Now, a stimulating treatment is suitable, and the Flores arnicæ are especially useful. I give this admirable remedy as an infusion (1½ to 2 drachms to make 6 or 8 oz. of strained infusion), and add some dilute sulphuric acid to moderate the vascular excitement, or if necessary also a laxative, *e.g.*, aq. laxat. Vienn. The dose is to be gradually increased. From a timely use of this remedy I have often seen the most excellent results. The patients gradually awake from their drowsy and stupid condition, they seem more lively, their warmer hands, and better radial pulse indicate a more equable circulation, the silly expression of countenance is lost, and the eye becomes livelier, the appetite which had perhaps suffered from the long use of tartar emetic, improves, and the nutrition increases, the cachectic state with tendency to formation of furuncles vanishes, and recovery regularly progresses.

If the patient is yet more weakened, and the cachectic condition more strongly developed, if there is a tendency to diarrhœa or a dropsical state, if the patient is still collapsing, then I give in preference the Radix arnicæ in decoction, half an ounce to seven ounces of water, of which two tablespoonfuls are to be taken four or five times a day. Physicians usually do not bestow due consideration on this excellent remedy, especially in practice among the poor; the exciting quality of the Flores arnicæ, is in it combined with more tonic property. This remedy has rarely failed me, if an exhausting diarrhœa had to be combatted. But it also acts no less well, if no diarrhœa is present, and in many cases of chronic mania, I have succeeded by this drug, in bringing about a recovery from a hopeless state.

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* Many of those suffering from chronic insanity, speak apart from their mistaken idea, quite sensibly upon other things. This depends upon the amount of brain affection and of the insanity which have preceded, likewise upon the more or less excited condition of the patient.

† I sometimes make the patient write. If his letters have now another appearance, if the lines are more oblique, in a word if the writing is altered, according to my experience the recovery of such a patient is not to be expected.

Also in those who were exhausted by onanism and appeared to have already fallen into a state of imbecility, I have even seen recovery occur through the use of Radix arnicæ; that only happens when, during the course of meningitis, incurable changes have not already taken place in the brain. I have sometimes, also, given with advantage Flores arnicæ and Radix arnicæ together, when a more powerful excitant seemed to be required. Generally, by the use of Radix arnicæ, it is superfluous to employ cinchona, which indeed acts as a tonic, but wants the exciting action on the nervous system for which Radix arnicæ is distinguished. The arnica root especially commends itself in practice among the poor, on account of its lower price. In very developed cachexia, I have several times, with good result, combined Flor. arnicæ and Cort. cinchonæ.

If during the use of this remedy, signs of congestion and great excitement of the brain appear, then we endeavour to oppose it, by cupping and other derivative measures at the nape of the neck. Frequently, the excitability of the patient is still too great, and much irritation of the nervous system is produced by the use of the arnica. Then the chronic meningitis is in a still more active state, and we must again for some time revert to calming measures.

Also, against the involuntary evacuation of fœces and urine, which so often appear in this stage; the Radix arnicæ is indicated, if the state of the patient otherwise does not contraindicate it. If paralytic symptoms show themselves, for example, trembling of the angles of the mouth in speaking, stammering, heaviness of gait, the arnica may still act beneficially; and I have even seen recovery in some cases of the kind.

On the occurrence of paralytic symptoms, Nux vomica may also act beneficially, and check the further progress towards dementia, but I have not so freqnently seen good results from it, as from the Flores arnicæ.

If the weakness arises not so much from depression of the nervous system, as from cachexia, and diminished plasticity of the juices, which is often manifested by dropsical symptoms, and may also occur with weakness which proceeds from the nervous system; then preparations of iron are suitable. But as a tonic, iron is also often useful in nervous affections, without increasing the sensibility of the nervous system.

Also under such circumstances powerful derivatives come into use, *e.g.*, Ung. Autenriethii to the nape of the neck, or to the vertex, but here we must be mindful of the collections of matter under the skin, which are apt to occur from long use of this ointment.* We may also burn a moxa on the head, for this, cotton wool saturated with saltpetre is most convenient. I have also often made an incision on the top of the head, it is best in a transverse direction so that the wound gapes more, and should be down to the pericranium. Such an incision is not really very painful, and is quickly made. The consequent bleeding serves at the same time as a derivative. A few small peas are to be placed in the wound, in order to maintain suppuration. I have in this way cured yet a few patients. I have never seen any disadvantages from this proceeding, to which I not rarely have recourse; but I must indeed remark that other physicians assured me that they have observed ill effects.

If we do not succeed in restoring the patient by these means, he gradually sinks, becomes quite foolish and stupid, and generally various paralytic symptoms appear, *e.g.*, the gait becomes unsteady, and the face vacant. An apoplectic attack generally at last puts an end to his miserable existence.

SECTION 10.—*Obtuseness.*

From real stupidity, we must distinguish that state of dulness and obtuseness which has been accurately described by Etoc Demazy. The patient sits immovable, without answering a question, does not move his eyes, the pupils of which, moreover, are not always dilated, does not direct his attention to any single object, and appears to be quite devoid of thought. In a higher degree of the complaint, the mouth even is not always closed, and the saliva dribbles continually down over the chin; indeed, hunger, which generally disturbs even idiots, appears not always to be perceived. The urine and fœces are passed involuntarily.

Etoc Demazy finds in this condition an œdema cerebri, and this I will not exactly contradict; yet I have not always found the brain softer, but rather compressed with flattening of the convolutions. Pressure on the grey cortical layer appears to me, therefore, to be the essential cause of this condition.

Etoc Demazy saw some patients recover, yet he adds that his therapeutics left much to be wished for. Indeed, he recommends, without distinction, and in the same sentence, purgatives, diuretics, sudorifics, sialogogues, and revulsives. He also communicates a case where recovery was brought about by a large blister on the head.

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* The mode of preparing this ointment is also to be attended to. If water is added to the tartar emetic before it is mixed with the grease or even during this admixture, it is partially dissolved. It is then more finely divided, acts more powerfully, and becomes absorbed more quickly, so that from the employment of an ointment so prepared I have observed repeated vomiting and diarrhœa with great depression of the whole system. If the tartar emetic is rubbed in the form of powder into the grease, then this action of the ointment on the general system, no longer easily happens. Thus, under circumstances when the patient will take no medicine, the first described ointment may be applicable.

However severely the symptoms may come on, we must not confound such patients with the truly demented and regard them as incurable. I have seen more than one patient of the kind recover, especially through incision of the scalp. In one case, with simultaneous derivation through the intestinal canal a seton was efficacious, and also the inducing of menstruation. Cupping in the nape of the neck may also be beneficial.

SECTION 11.—*Dementia and Idiotism.*

I will not enter into a prolix description of the different signs of imbecility (dementia) out of whose totality it may be distinctly concluded that here an incurable state is before us. I will only point out this, that with good treatment such patients may be very obedient and useful; they are as a rule the most diligent and laborious inhabitants of the insane institution, and by gentle treatment are easily led and are very willing. The more judiciously we care for their physical treatment, and the more carefully all causes of passion and emotion are kept away from them, the more quietly do things go in such an institution.

If apoplexy has preceded, then generally more or less of paralytic symptoms are present. In many individuals the memory suffers, and indeed often the memory for words only; they then give to each thing another name, speak for example of a house, when they require bread, become thus quite unintelligible, and get exasperated when one does not understand what they wish. Others lose their memory completely, and live as it were only in the time of their youth, the recollection of which still remains to them. Others constantly become more paralytic, or subject to epileptic fits.

Upon idiotism, or congenital insanity, I shall be absolutely silent. Only a psychical influence may sometimes here have an effect, but not a medical treatment. These conditions, therefore, do not lie in my province.

B. SYMPATHETIC INSANITY.

SECTION 1.—*Introduction.*

We may again distinguish some subdivisions of sympathetic insanity, according to the different parts which are the primary seat of the disease, and from which the latter has extended secondarily to the brain.

If we must regard the brain as the instrument through which the various impressions are conveyed to the mind, so also are the pathological impressions and perceptions very different from one another according to the region from which they proceed. Is it not so when in the healthy condition, we become conscious of impressions and irritations arising in the stomach or the intestines or the sexual parts or the thoracic organs? But here there is the essential difference, that in the healthy state we usually feel from whence the irritation or the excitement proceeds, whilst in sympathetic mania this is generally not at all the case, or at least only in a very slight degree, and very indistinctly. The recognition of the proper primary seat of the disease, whence the sympathetic brain mischief has arisen, becomes therefore much more difficult than in idiopathic mania, and, for the most part, this seat can only be inferred from the character of the insanity. Only by continued and repeated observations of many patients can one see one's way through the labyrinth of varied phenomena, to determine with any certainty the original seat and origin of the disease. But as the knowledge of this primary seat of the disease is, for the therapeutics of sympathetic insanity, of the highest importance, I have for years endeavoured, by comparing the morbid anatomy with the previous history of the patient, to discover more or less reliable diagnostic signs.

SECTION 2.—*Physiological Explanation of Sympathetic Insanity.*

As in this kind of insanity the brain suffers only secondarily, in consequence of the connection between the different peripheral organs and the central nervous system, it is intelligible that the mental confusion in it does not reach so high a degree, and that the course of the disease is also slower. In fact, sympathetic mania usually comes on with symptoms differing from idiopathic.

Irritation proceeding from the brain and its membranes is characterised by quickness in action, by liveliness of the fancy, by excited consciousness, by a proud and haughty demeanour; in the secondary brain affection, on the contrary, the congestion is of a more passive or venous character, the cerebral irritation is not so considerable, the disposition especially suffers, and there is often a feeling of pressure and heaviness in the head.

With few exceptions, the sufferer from sympathetic mania appears less excited, but he is oppressed by an equally unrecognised feeling of anguish, which he cannot get rid of. As generally he cannot find any ground for this feeling in his own body, but on the contrary, like a sufferer from idiopathic mania, considers himself quite healthy, he seeks the cause of his misery in quite other conditions, mostly external to his own organism.

We must here keep in mind that the expressions of the brain do not manifest themselves by any particular feeling of pain, but so far as the surface of the brain is concerned, appear as images and ideas, or as imperfect perceptions, or as a peculiar frame of mind. As is known, even in a healthy state, we have often quite involuntarily many images and thoughts, even whilst we are speaking or writing of other things, and we think no more of it, although it is not rarely difficult to free ourselves from them.

This is also repeated in dreams. But if a more passive congestion occurs, as from a tight neckcloth, or a depending position of the head, then generally more alarming images arise, probably in consequence of retention of venous blood, and impeded circulation. If the brain is strongly excited, and more arterial blood circulates through the vessels, then the dreams are more lively, and the fanciful ideas follow one another in quick succession without anything of an anxious nature being attached.

This is repeated, as I believe, in sympathetic mania. In most of its forms, especially in those attended with melancholy, cerebral congestion, rather of a venous character, is present. At first, the patients complain of a peculiar sensation of warmth or of a pressure on the top of the head. The head is generally reddened, often rather swollen, the vertex feels warmer, and sometimes also the back of the head, or even the forehead, but this is oftener present in idiopathic mania; but the hands and feet, on the contrary, especially in the further course of the disease, are cool and bluish, the radial pulse is small and soft, the carotids beat more strongly. Everything points to irregular circulation, and venous congestion of the brain, although the latter is not always manifested in a red injected face. Now also appear occasional manifestations of melancholy, and the face shows a pale yellowish or brownish colouring, which either was present before, or which may depend upon complications, for example, with disease of the liver. The depressed tone of mind depends in great measure on that venous congestion; it is like a dream in the waking state, which the patient, in vain, endeavours to repress.

The evil to the brain of such passive congestion, appears to depend in no small degree, upon the increased access of blood, and the mechanical distension of the vessels. At the same time, the circulation is also rendered slower, the venous blood lingers longer in the capillaries, the arterial blood is less quickly supplied, and consequently the nutrition or interchange of matter of the brain, and therefore also its activity and excitation, must suffer. We all know how enlivening is the influence of pure fresh air on ourselves, making us feel more animated and active, and how by the increased inhalation of oxygen all the functions of the nervous and muscular systems speed more rapidly and vigorously, while on the other hand a small confined apartment full of impure air, makes us dull and indolent, and impedes us in deep reflection. We observe the same thing in conditions of disease. If the blood more powerfully stimulates, as, for example, in pulmonary phthisis, where on account of the emaciation no pressure on the brain, nor too great filling of its vessels arises, and where the excitement of the heart, which is betrayed by the accelerated pulse, induces a more rapid current through the vessels of the brain, then there are manifested a livelier excitation, greater rapidity of thought and more vivid fancy. On the other hand, narrow-chested persons, and such as suffer from asthma, are pusillanimous and easily frightened. In the same way do pathological changes of the blood affect our frame of mind. Thus Burdach (*Bau und Leben des Gehirns* iii., s. 115) remarks that the scorbutic are low-spirited and depressed. It is generally known that the chlorotic make themselves disagreeable, by a peevish, fretful disposition; those suffering from jaundice are, for the most part, melancholy, languid, indolent, and morose. To the delirium, which, in nervous and putrid fever, stands in close connection with the blood changes, I need not more particularly refer.

The want of blood in consequence of hæmorrhage, and too copious withdrawal of blood, causes, as is well known, fainting fits, convulsions, delirium, and so forth. Here we have to take into account, not merely the lessened tension of the blood vessels, but also the slower circulation through the brain and the diminished supply of arterial blood.

However, we cannot explain sympathetic mania or melancholy either through the increase or diminution of the quantity of blood streaming to the brain, or through the more rapid or more sluggish circulation, or from the altered quality of the blood. The examples adduced are merely intended to show what great influence the blood exercises on the life of the brain. The real way in which a distant part can exercise a pathological influence on the brain is doubtless to be sought in the nerves, especially in the sympathetic, or also in the vagus. Although not in all cases, yet in most, the sympathetic appears to act in a reflex manner on the brain, from the affected part through the track of the spinal marrow. Whether such action can also occur directly through the cord of the sympathetic is not determined; it is indeed improbable, as the reflex action of the sympathetic on the spinal marrow is known well enough. The nerves of the descending colon, of the sexual parts, of the uterus, are those principally concerned.

From the extensive ramification of the fibres of the sympathetic in the cavity of the skull on the vessels of the brain, we may suspect that it is chiefly through its influence that local congestions of the brain occur. In fact, Brachet (*Recherches sur les fonctions du système nerveux:* Paris, 1830, p. 155) after he had divided the cervical part of the sympathetic, observed congestion and exudation occur only in the hemisphere of the same side. More recently, Bernard (*Comptes rendus*, 1852, 20 Mars, p. 472) has shown that after section of the cervical part of the sympathic on one side, the same side of the head is of a higher temperature, and that the arteries of this side are more distended, the parts therefore more vascular. This congestion diminishes indeed in the following days, but the increased temperature of the affected side of the head is maintained. Therefore after section of the trunk, a pathological irritation must proceed from the superior cervical ganglion.

Isolated observations, however, prove quite decidedly that from many organs a sympathetic influence may proceed to the brain, thus for instance in the case seen by Larry (p. 56), of a soldier with a fistulous wound of the belly caused by a bullet. In such cases we must of necessity assume a reflex action of the sympathetic on the brain, through which there arises congestion of some isolated parts of the brain, and indeed mostly congestion of a passive character. But from this congestion alone the phenomena are not well explained. It appears especially in chronic cases not to extend regularly over all parts of the brain, but to affect especially the region of the vertex, or also the back of the head. Mostly spinal irritation occurs then also in the neck, so that a pressure on the upper vertebræ excites an unpleasant sensation in the head. If the congestion were present in every part of the brain, then the organs of the senses would also suffer, especially the organ of vision. In more general plethora and congestion of the head, we certainly find dilatation of the pupils, flashes before the eyes, diminished power of vision, which in more passive chronic states, do not occur.

SECTION 3.—*Pathological Anatomy of Sympathetic Mania.*

If we are ignorant of the patient's history, it may be difficult, merely by means of the section, to ascertain what parts have suffered primarily, and what, secondarily, as from affections of the brain and spinal cord, a reaction on the intestines occurs, just as conversely, from affections of the intestines, a reaction on the central nervous system is noted.

Most frequently, changes take place in the colon, especially in melancholy, wherewith generally sluggish bowels, and so called obstructions are apt to be combined. Nearly always the descending colon is the suffering part; here are seen constrictions and narrowings which can either not be effaced by blowing up, or only with great difficulty. The position of these strictures varies. They are found below the sigmoid flexure, at the transition into the rectum, in which case the sigmoid flexure is usually widened, lengthened, and distended with gas: it is perhaps at the same time pressed upwards, indeed it may reach to the transverse colon, or even still higher up. In other cases the strictures are seated in the descending colon above the sigmoid flexure; then the transverse colon is widened and elongated, so that it reaches down into the pelvis, and then again mounts up to the liver:* the cœcum may also be enlarged. Several strictures may occur in the descending colon, above and below the sigmoid flexure, whereby the latter and the transverse colon may be widened in different degrees. Narrowings of the transvere or of the ascending colon have not been observed by me. The coats of the colon are for the most part thinned and stretched, but at the strictures the intestine may be narrowed to the thickness of a finger. The mucous membrane has generally a healthy appearance on the inner surface, but at the strictures it is often somewhat thickened and red. In a few cases I have met with inflammation and ulceration. In a case of obstinate and incurable melancholy with tendency to suicide, the inner surface of the whole of the colon was much inflamed and ulcerated, and in the cœcum there was a perforated spot which was covered by false membranes.

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* I have once or twice found the transverse colon elongated, and pressed upwards between the liver and the diaphragm; the upper surface of the liver was not adherent to the colon, but had a peculiar depression for the reception of the transverse colon. In a case of melancholy, which had passed into mania and dementia, the transverse colon lay even above the liver, and had passed through the diaphragm under the ensiform cartilage, forming a phrenic hernia as large as a fist, the coats of which were formed by the peritoneum and the pleura.

In such cases a tendency to constipation has generally long existed.

The elongation of the colon appears to occur as a congenital condition, since it has been met with even in children. Monterossi (*Meckel's Archiv, f. Phys*, 1820, Bd. 6, s. 566; taf. vi. u. vii.) believes it to be the cause of death in many new-born children, and gives representations of this occurrence. Morgagni and others had already remarked upon these elongations of the colon. Then Esquirol especially directed attention to their frequent occurrence in the insane, without being able to give any explanation of it. I have already expressed myself more in detail upon this subject in the work of J. B. te Welscher (*Diss, de quibusdam coli affectionibus. Traj. ad Rhenum*, 1841).

There can be no doubt that in most cases, elongations of the colon have arisen through previous spasmodic contractions and strictures of the left colon. For the most part such patients have at an earlier period suffered from constipation, so that, sometimes, they went to stool only once in several days. The masses of fœces are kept back by these strictures; simultaneously therewith, gas is developed, and the transverse colon perhaps even back to the cœcum is distended, or if the stricture is seated lower down, the sigmoid flexure above the rectum is the distended part. The fœcal masses, which become indurated by long delay in the intestine, have an irritating effect on the stricture, and with the thus increased narrowing, they themselves block up the passage.* On this account, sharp drastics are not suitable here, because by irritating the intestine they increase the strictures, so that the solid masses remain behind, and only watery stools follow.

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* The anatomical relations must be here taken into consideration. The descending colon above the sigmoid flexure is attached by a very short mesocolon to the muscular wall of the abdomen, and is supported thereby. The commencing part of the rectum and the pelvis below the sigmoid flexure stand in a certain manner in similar relation to each other. On the other hand, the sigmoid flexure, like the transverse colon, is quite freely movable, and nowhere attached to the wall of the belly; these parts are less supported, and they are more easily stretched. This is promoted by a sedentary life, which weakens the abdominal muscles, and the intestines, especially the transverse colon and the sigmoid flexure, are less compressed and supported by the abdominal walls; through the increased development of gas, and the retained fœcal masses they are easier distended and elongated. Moreover, no very minute details are needed to show that the tension of the abdominal wall in the upright posture, the movements of the body which increase the action of the muscular walls, and the more active respiration, must have, as a consequence, an increased pressure on the intestines supported against the wall of the abdomen, on the ascending and transverse colon as well as on a part of the descending colon, by which their contraction, and therefore the carrying onwards of their contents, must be assisted.

But not alone do the walls of the large intestine stretch, the blood-vessels spread therein also undergo a distension and elongation. I have sometimes found the large intestine as much as two feet longer than usual, without it being on that account less vascular. The mesenteric arteries have a small calibre in comparison with their extensive area of distribution, from which we may conclude that generally the circulation in the intestine must be anything but rapid.

If, now, the intestine, and especially the colon, suffers great distension, then also at the same time the area of the vena cava becomes enlarged. But in the course of the vena cava the blood must completely traverse the liver,—here, consequently, it finds a greater resistance, and the result must be that in the small vessels at the peripheral commencement of the vena cava—that is to say, in the colon—more blood accumulates. Pressure from the impeded passage of indurated masses of fœces still more contributes to this accumulation of blood. Thus arise the hæmorrhoidal tumours which we so often find in melancholic patients.

It is not improbable that from the impeded circulation, and the accumulation of a more venous blood about the branches of the sympathetic, an injurious influence on this nerve is induced. Thus is explained, at least in part, why loss of blood from piles in these patients may be so beneficial, and a repression of the bleeding may have such bad consequences. In connection herewith the question occurs, whether the liver so overfilled, is in a condition to accomplish the important changes and purifications of the general blood mass, with which this organ is entrusted.

It is further of special importance, that we keep in view the close connection between the descending colon and the generative parts, which authors in general have not sufficiently regarded.

Anatomy teaches us, particularly, that the nerves of the uterus, as well as of the vesiculæ seminales, and also the nerves of the urinary bladder and uretus, stand in intimate connection with the inferior mesenteric plexus, whose branches reach the descending colon; moreover, the nerves for the parts of generation are also connected with the hypogastric flexus which runs down from the aorta to the pelvis, and on the left side gives branches to the descending colon. The transverse and the ascending colon on the contrary receive their nerves from the superior mesenteric plexus. Just in the same way the inferior mesenteric artery supplies branches to the left colon, and also gives off internal hæmorrhoidal branches, which anastomose with the vessels of the uterus, the urinary bladder, and the vesiculæ seminales.

We cannot, therefore, be surprised, if we not rarely find the left colon and the generative parts diseased at the same time, or if disease is conveyed from one apparatus to the other. Thus in hysterical patients there occurs pain in the left side, which by many is erroneously referred to the spleen, but which depends merely on spasmodic contractions and strictures in the left colon, and not rarely reaches along the transverse colon, as an unpleasant feeling of heaviness or pressure under the stomach.

Pollutions and tendency to onanism are frequently maintained by hæmorrhoidal congestion, just as in the opposite direction an irritation of the sexual parts often acts on the colon and causes sluggishness of the bowels. Several times in inveterate onanists I have found considerable varicous enlargement of the veins about the vesiculæ seminales.

Such congestions and affections of the sexual parts, cause moreover not unfrequently hypertrophies and fibrous tumours of the uterus, and especially degenerations of the ovaries.

Herewith it is noteworthy that when the sympathetic insanity has proceeded from the sexual parts, the melancholic ideas assume a peculiar hue and a special character, on which account one may with some certainty conversely refer back to the seat and essential cause of the disease.

But the lungs and the air passages may also be the principally suffering parts in sympathetic mania. It is well known that phthisis and chest affections in general stand in close relation with brain affections; and writers declare that most of those who succumb under chronic diseases of the brain, especially softening of the brain, die with heart and lung mischief. I have several times observed, that in families where insanity was hereditary, those members who remained free from this mischief usually died from phthisis. These two diseases often alternate with each other, or they occur together; but it is not easy to determine whether the lung disease was secondary, or whether it could have come on primarily, and have exercised its influence on the brain and the medulla oblongata. Not rarely we find in the insane very considerable lung mischief, which during life was not manifested by any remarkable symptoms; in such cases cough is often quite absent, one even sees no expectoration, probably because the patient always swallows it; and only by the emaciation, the accelerated pulse, the peculiar expression of countenance, and the external examination of the chest, can the lung affection be recognised.

It is not, however, to be supposed that the diseases mentioned in remote parts of the body are able of themselves to bring on insanity; elongations and strictures of the colon, tendency to constipation, affections of the uterus, of the ovaries, of the lungs, happen frequently enough without the least trace of intellectual confusion. There must be, in addition, a peculiar disposition and a particular excitability of the cerebral system. There exists a mutual reaction between the brain, the spinal cord, and the intestines; through this it is often difficult to decide in which part the disease has originated. For even in idiopathic insanity those elongations and strictures of the colon occur in idiopathic mania and in violent excitement of the brain; sexual excitement is also apt to arise; and sluggish bowels and obstinate constipation are among the most common symptoms of inflammation of the spinal marrow. Strictures of the colon and sexual excitement may also in many cases depend upon a preceding affection of the brain or of the spinal marrow; but if they are once in existence, they themselves exert an injurious influence on the last-named parts, and contribute to the production of sympathetic insanity.

It is here of importance to know what part is most powerfully attacked, and at the same time gives the ground colour from which the insanity derives its peculiar hue. The physician must allow himself to be guided by the previous and present symptoms. If the disease is seated essentially in the brain, then rather a general excitement is displayed, the patient is generally far more lively, and in all his conversation his increased self-sufficiency is apparent, as I have stated in regard to idiopathic mania. If the affection of the intestine preponderates, the patient is usually by far not so lively and excited, but all his ideas have a dark back-ground.

Towards other people he may for a long time so govern himself, that one observes almost nothing about him; he speaks for example quite sagaciously about things which stand in no direct relation with his melancholy. His understanding also is not confused. But he is incessantly governed by a perverted fancy, or an uneasy dream, and he cannot get rid of his sorrowful ideas and self accusations; his feeling and disposition exercise a pathological influence over his understanding. A strange, to him inexplicable, impression acts on his brain and on his understanding; this misleads him, and hurries him irresistibly along with it.

I have, however, observed that in general the conversation is more lively, the emotions and anguish are more pronounced when the lungs suffer than when the disease proceeds from the colon or from the sexual apparatus. However, in this the influence of constitution and sex is often considerable.

In sections, we find as a rule the same changes as in commencing idiopathic mania: the vessels generally distended; the pia mater over the hemispheres often covered with a serous exudation, which is deposited between it and the arachnoid; if the pia mater is ruptured, the grey cortex shows alternately in different places a bright red and a paler colour. When the disease has lasted longer, the pia mater has become adherent to the convolutions of the brain, and is only with difficulty separated. Generally, however, in melancholy, especially when it proceeds from the intestines and sexual parts, the vertex and back of the head are most affected, and the anterior part of the hemispheres, under the frontal bones, displays the fewer pathological changes, in proportion as the patient, during his melancholy, has remained free from general intellectual confusion, and apart from his ruling false idea, spoke sensibly. In idiopathic mania these anterior parts of the hemispheres suffer more. But if now, by long duration of the melancholy, the sympathetic brain affection has at length become idiopathic, and the melancholy passes into mania or dementia, then the brain affection is no longer so circumscribed, but in some cases a general chronic meningitis is established, with the same consequences which occur in idiopathic mania. But in respect to this we can only seldom carry out accurate and reliable observations. In a few cases in which this opportunity was afforded to me I found the brain affection more limited to the vertex.

I have formerly published (*Nederl. Lancet*, 1851, July, p. 25) an interesting observation in connection with this subject; it relates to a woman, who, probably, in consequence of previous onanism suffered from incurable melancholy, whilst she was otherwise quite sensible and of keen judgment, and who put an end to her sad life by a leap from a staircase, in which she fell on her head. The intervertebral cartilage between the third and fourth cervical vertebræ was quite rent, and the spinal marrow was compressed and flattened, so that during the twenty-four hours which elapsed before death, sensation as well as motion, was paralysed throughout the body. However, during this time the melancholy and the suicidal tendency remained quite unaltered; the woman resisted every rendering of help, and only regretted that she had not instantly killed herself. By the injury to the spinal marrow, the communication from the elongated and distended colon and from the uterus, interspersed with fibroid tumours to the brain was cut off, but, nevertheless, the melancholy thoughts remained. In the cavity of the skull, there was found chronic inflammation of the pia mater, and adhesion of it to the convolutions of the brain, but only above, under the parietal bones, for the anterior lobes of the brain beneath the frontal bones were quite healthy. Thus, here, out of the sympathetic melancholy, an idiopathic had also become developed, which, indeed, was quite in accordance with the symptoms during life. If the irritation and the chronic inflammation had also extended under the frontal bone, then, doubtless, other symptoms would have appeared during life; there would have been more confusion of intellect, and a less intelligent judgment, and there would have been melancholy and mania, or dementia developed.

I have already affirmed that generally the medulla oblongata also takes part in this cerebral congestion, and that pressure on the upper cervical vertebræ is usually attended by unpleasant sensations in the head.

SECTION 4.—*Symptoms of Sympathetic Mania proceeding from the Colon.*

An intellectual disturbance which has its origin in this source is characterised by a peculiar depression of spirits, by anguish of mind, and by the patient's self-accusations of wickedness and baseness either in the present or in some previous time. The disease has a very slow course, and generally the anguish of mind, and the self-accusings have already existed some time before the physician is consulted. At first the patient strives against his gloomy thoughts, and in presence of strangers, he behaves quite like a sane person, so that one does not perceive or suspect anything unusual about him. This does not happen in idiopathic insanity. Moreover, the patient has generally suffered previously from sluggish bowels, sometimes even for years; often, the bowels are only open once in several days, without this having caused him any particular annoyance. In addition, not rarely do hæmorrhoidal complaints appear, namely, tumours and bleedings at the anus, or perhaps also a violent itching in this part. These hæmorrhoidal sufferings however, especially the loss of blood, have usually diminished or even quite ceased before the outbreak of melancholy.

The melancholy usually increases slowly, if the mournful frame of mind is not more strongly developed by special circumstances. The patient seeks to be alone, and likes to conceal himself in a dark corner. He has also an extremely unpleasant feeling in the præcordia, which not unfrequently extends towards the left side, especially in women, and in them hysterical symptoms are sometimes added, especially the so-called globus hystericus. Further, there is present an indescribable feeling of distress which does not, in the least, lose ground, and which is generally interpreted as qualms of conscience.

Now, as in such a depressed tone of spirits, a feeling of pressure and heaviness in the region of the transverse colon arises, so conversely do affections of this intestine react on the spirits, and induce that feeling of sadness, of whose origin in a diseased condition the patient cannot be convinced, but which he much rather regards as real qualms of conscience, and in proof often knows how to adduce various grounds for his opinion. The self-accusations show of course individual differences, but they generally run in this style, that the patients, like wicked abominable men, have rendered their relations and friends unhappy, or have plunged them into poverty. They accuse themselves of want of affection towards relations, wives, or husbands, or children; they believe, perhaps, that their nearest relations are dead, and that those who assume to be them, are only strange intruders who have possessed themselves of the clothes and property of their real relations; they consider themselves the cause of accidentally prevailing diseases, for through their poisonous breath or other noxious qualities, as they think, all who come near them must die or wither away; through their own fault they have fallen into the greatest poverty, and they can consume nothing because they are not able to pay for it; they are afraid of being brought to justice and of being subjected to the most dreadful tortures; were they formerly as artists or musicians animated by ambition, they believe that they have neglected their vocation, so that they are now surpassed by others, and have fallen under contempt. It has also several times happened in my knowledge that mothers who, through loss of their children, or even through vexation and ill-treatment which they had received from their own children, had fallen into melancholy, exactly inverted the relation of things, so that they contended they had, through carelessness, caused the death of their children, or had squandered their fortune. Or a daughter had become inconsolable because, in her attendance on a sick mother, she had overlooked some trifle, and had thereby caused her death. In one case where the sick mother had recovered, the daughter continually lamented that she had been guilty of the death of her mother, because on one occasion she had neglected to give her at the proper time the medicine prescribed.

As an instructive illustration, I relate in detail the following case, since it is only seldom that one has the opportunity of following so closely the whole chain of causes and effects, and of so thoroughly exploring the mental injury as here. It concerns a lady fifty years of age, a widow with five children, of delicate bodily frame and sensitive constitution, who on account of her agreeable behaviour and her remarkable intelligence was generally esteemed. For many years she had mourned the loss of her husband, who had perished as a high officer, in the Spanish war. Afterwards she had a support in her eldest son. He was in everything, her counseller, helper, and true friend, and he did nothing without the concurrence of his mother, who likewise always was guided by his views and advice. Although somewhat proud, this son was befooled by a girl of remarkable beauty, and of blameless morals, but who was below him in station. When the mother heard this, she most decidedly disapproved of his inclination, and declared that she would never give her consent to this union. The son, when this expression reached his ear, in order not to vex his mother, denied the affair, with a view either of withdrawing from the girl, or of waiting for more propitious times. The mother, trusting to this assurance of her son, was quite calmed; but the son languished in love melancholy, and soon fell into a rapidly progressing lung phthisis. The mother did not leave the bedside of her loved son, but tended him with motherly care and gentleness, in constant fear and anguish on account of the rapid advance of the disease, and the loss of strength. One day she received from the girl a letter, earnestly supplicating to be allowed to see her lover once more before his death. On reading this letter the woman was affected to such a degree that she fell down in a swoon, and at first seemed to be quite out of her senses: for the first time she found herself deceived by her beloved son, who had denied the whole matter.

But in the condition of the patient, there could be no thought of entertaining the girl's request. As soon as the unhappy mother had been comforted and calmed by her other children, she turned back to the sick bed where she now suffered under a double torture; she could not say a word about the subject to her loved son, dared not even hint at it, for he must be spared every mental excitement, and with the deepest sorrow in her breast, she was obliged to cheer him and appear as calm as possible. This was too much for her, every now and then she left the room and burst out into tears, until she again felt strength to repress the internal struggle. In a few weeks however she seemed to be somewhat calmer, but deep sorrow for the still nearer approaching end of her son, and constrained silence upon the affair so deeply touching her, overpowered her at last, so that five weeks after receipt of the letter, she fell into melancholy and thorough intellectual confusion. She was speedily conveyed from the house and brought to a relation, so that the misfortune of his mother was concealed from the patient. But fate required yet more! The youngest child, a pretty and amiable girl, not only grieved for a sick brother and a sick mother, but also suffered from disappointed love, through a faithless lover. She had a violent hæmorrhage and this led to galloping consumption. She died within a few weeks, and the brother, from whom the disease of the mother had been kept concealed, soon followed her. Only five weeks after the outbreak of the mother's insanity, the two children sank into the grave. The unhappy mother in her frenzy accused not her son, but herself, for having left him in his death struggle, although her desire to see him could not be granted; she considered herself the most wicked creature, from whom proceeded all the evil in the world, and especially the then (1826) prevailing Gröningen fever, which she heard spoken about. After some time came an intermission of the melancholy, so that to-day the patient would be in the deepest despair and in complete confusion of intellect, but to-morrow perfectly herself again, and would speak reasonably on every subject. On her good days she would remember nothing of the previous melancholy ones. Her physician gave her cinchona, belladonna, and other narcotics and nervines, without result. She then came under the treatment of another physician who bled her; this had a certain calming effect. She now became aware of the death of both children, which for two weeks had been carefully concealed from her, but at first she would not believe it at all. From a second bleeding, she again became more calm. From that time, she considered herself the sole cause of the death of both her children; in her craziness she believed herself so degenerated, that everything she came in contact with, immediately turned to poison fatal to everybody. The melancholy remained without interruption, and her condition underwent no change through the use of narcotics and nervines for several months, so that at last the physicians resolved to leave the disease to nature. In July, 1827, nearly a year after the outbreak of the insanity, I was summoned to the patient, whom before her illness, I had known very well. I ascertained that menstruation had ceased at the usual time, and that the woman had formerly suffered repeatedly from hæmorrhoids which more recently had disappeared. The bowels were very sluggish, and she would not take any medicine. I endeavoured therefore to administer tartar emetic in the food and drink, and hoped in this way to effect improvement so far, that then other remedies might be brought into use. But the execution was difficult. In the month of October, I found that the tartar emetic was now first regularly taken, but that it easily induced nausea and vomiting, on which account I had the dose diminished; after that the remedy had been regularly employed, the report stated that she could be led away from her ideas, and that one could speak with her on other subjects. After some time she was again under the domination of another idea. She complained from time to time of colicky pains, and weight in the lower part of the belly; she imagined that she was pregnant, that labour might come on at any moment, on which account she dared not leave the house. This notion tortured her most acutely. The cause of her pregnancy she could not state, but she was firmly convinced of its existence, and she execrated herself on account of the great shame by which the whole family would be dishonoured. I had from the first wished to apply leeches to the anus, but could not achieve my object. Likewise as the patient would take no medicine, I was unable to administer the extr. aloes aquosum, which appeared to me to be all the more indicated in this case, because the tartar emetic induced vomiting sooner than it affected the constipation. At last the attempts to make the patient take some pills of extr. aloes were successful, the patient being told that these pills were good against sickness, that they strengthened the stomach and were very beneficial in pregnancy. In the month of December, one of her sons announced to me that since the use of the pills, the patient's condition had much improved. Large masses had been evacuated, and the bowels had become regular; the patient began of her own accord to speak with others upon various subjects, and indeed even joined in a laugh. She no longer eat so much as before, but her sleep was still always unquiet. The visit of her son (for she now dwelt in the country) no longer, as formerly, put her into grief and despair, in which she would hear no reasonable persuasions. Nevertheless, she still considered herself pregnant, but spoke less about it, and sometimes wondered that the pregnancy was of so long duration. The dose of the pills was gradually increased until two or three ordinary stools occurred daily. In the following March, I again received news that through the continued use of the pills, her condition had improved remarkably. There was now nothing more said about pregnancy. The death of her beloved son and of her daughter she still ascribed to her absence, for through redoubled care she might have prevented their death. Notwithstanding, she did not speak so entirely despairingly of this as before, when the mere thought of it called forth wringing of hands and a flood of tears. Her eyes were clearer and she was more calm. The death of a loved sister she bore with sorrow, but yet with tranquillity. She prepared mourning clothes with her own hands, and had always some feminine work, which before she would have nothing to do with.

The ground or cause of their qualms of conscience, such melancholic patients find often in some very insignificant event, but which cannot again be undone. Accordingly, their guilt cannot be eradicated; a restoration is not to be thought of; and it is a futile trouble to attempt by reasoning during the violence of the disease, to bring the poor sufferers to a better judgment. All this impels the unfortunates to suicide.

The appetite is sometimes much increased, and the patients have constant hunger. To the physician who tries to persuade them that they are ill, they adduce this good appetite as proof of their perfect health. On that account they also generally oppose the taking of medicine, through which medical treatment in their own houses becomes very difficult, if not absolutely impossible.*

But in other cases the desire for food is entirely absent, and that for the most part is an indication that masses have accumulated in the intestines, and must be removed. This is often accompanied by bad smelling breath. In cases of this kind, the patients believe that they require no food, or that they do not deserve any food, or they seek, in abstaining from food, a means to put an end to their life.† These phenomena alternate according to age and sex. Thus men are mostly taciturn, shy, and reserved; women, on the contrary, are accustomed to complain constantly with great excitement.

The circulation is at the same time generally irregular; the hands and feet are usually cool, sometimes of a bluish colour, the radial pulse is small and contracted, the face is frequently reddened, the nose bluish-red, and swollen. At the beginning, and if the disease advances actively, the patients complain of a sensation of lightness, or even of pressure in the region of the vertex, or they have noises in the ears, or on shutting the eyes, and in the dark, they see flashes of light. The carotids pulsate strongly, and in this respect behave quite differently from the radials.

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* In melancholy with increased desire for food, I have generally at the same time observed a great irritation of the medulla oblongata, so that pressure on the upper part of the neck could not be borne. Probably this increased desire for food, proceeds as in idiopathic mania, from an irritated condition of the origin of the vagus.

† In a case of melancholy with complete absence of appetite and determined abstinence, the nasal tube had to be employed; it was only with difficulty introduced into the œsophagus. On section there was found ulceration of the thyroid gland which had remained concealed. The pus had burst out laterally, had pressed along the œsophagus into the cavity of the chest, indeed it had even entered the belly through the ostium œsophageum, and sunk along the vertebral column down to the kidneys. Above at the entrance into the chest, I found both vagi reddened and softened by inflammation, and through that the sensation of hunger had disappeared, for also in other cases of dysphagia with inflammation of this nerve, I have observed the complete absence of the feeling of hunger. Such observations, in my opinion, prove far better than a host of vivisections, that the vagus communicates the feeling of hunger.

Reading and every other intellectual exertion exhausts these patients, who are very forgetful. Another sign of cerebral irritation is the state of sleeplessness. They cannot sleep at all, or they become wakeful early in the morning, and spend the rest of the time in bed, in dreadful anguish and self-tormenting accusations, for their attention cannot then, as in the day-time, be diverted by other objects; yet it is very difficult to get them to leave their beds. Many suffer, particularly in the morning hours, and in the evening their condition is more tolerable; with others it is exactly the reverse. If the phenomena of cerebral irritation are very pronounced, then there is generally also a certain amount of spinal irritation with it, so that pressure on the upper part of the neck increases the unpleasant feelings in the head. Sometimes also parts lower down in the back are sensitive. If, at the same time, symptoms of difficult menstruation appear, or if uterine congestion is present, then spinal irritation is often manifested in the lumbar region; likewise also if fluor albus is present. In some acute cases, the urine is very dark, and deposits a sediment.

All these symptoms are explained by the affection of the colon, and its reflex influence on the upper part of the spinal marrow, on the brain, and even on the kidneys. In great præcordial distress, the transverse colon is often enlarged and full of stagnating masses. The bowels are then generally sluggish, and the feeling of uneasiness increases with the retention of the stools. Less frequently, the patients complain of an uncomfortable feeling in the right side, and in the region of the liver.

SECTION 5.—*Therapeutics of Sympathetic Mania proceeding from the Colon.*

Though a rational treatment must have regard to the state of the colon before everything else, yet the congestion of the medulla oblongata, and of the brain, together with the other reflex symptoms, must not be overlooked.

All remedies which act as violent irritants of the colon, the so-called drastics, only increase the tendency to stricture, they add to the sensibility of the colon, and the accumulation of blood in it, and cause watery stools, while the hard masses in the upper part of the large intestine still remain. The disquietude, the excitement, and the uneasy feeling of the patient, are thereby increased, but the strength is diminished if these medicines are continued for any length of time; the circulation becomes more and more irregular, the radial pulse becomes small, and the limbs cool.

The regulating of the bowels is with such patients often the most difficult point, and much depends on the choice of remedies. Senna leaves, tamarinds, and the neutral salts, act rather on the small intestine, and easily induce watery stools, or spasms in the intestines. Jalap also appears to me to act more on the small intestine. An infusion of senna with tamarinds, and a neutral salt or a little tartar emetic, I have often found very effectual, when previously-accumulated matters had to be removed, and derivation from the brain was required. Afterwards I generally gave a decoction of Rhamnus frangula, to which also, a little tartar emetic had been added, as this drug does not cause such watery stools, and does not induce colic. Used longer it acts as a tonic and stimulant.

The aqueous extract of aloes acts rather on the large intestine than on the small; it appears to cause a strong flow of blood to the mucous membrane and an increased secretion from it, on which account it may induce piles, and excite bleeding from them. If it is given in a larger dose at once, as many physicians order it, in the evening in the form of pill, it may easily irritate the colon too powerfully. Then the strictures increase, and irregularity of the bowels is the consequence, namely, watery stools, alternating with constipation, which increases the disquietude of the patient. If, on the contrary, it is given in repeated small doses, about five times a day or even every two hours, we obtain copious loamy or pulpy stools, often dark coloured and very offensive smelling; with these, also, indurated, differently coloured masses are voided, to the great relief of the patient. I have already mentioned above, that the addition of a small quantity of tartar emetic is very useful, because this still more secures the peculiar effect of the aloes, and gives also the advantage, that we need not further increase the dose to obtain a corresponding effect, but must rather gradually diminish it, because the sensibility of the intestine to this medicine increases more and more.* A more copious addition of tartar emetic causes irritation of the mucous membrane, and through the increased congestion watery stools are then produced; it is not easy here to hit the right quantity. Sometimes the tartar emetic is not borne at all, since it, even in very small doses, produces watery stools. In such cases, especially in the more chronic conditions, I have added to the aqueous extract of aloes, small doses of sulphate of copper, which, as a tonic, restrains the watery stools.

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* I have often been able to satisfy myself that in this disease the extract of aloes acts beneficially, not merely by removing accumulated masses of fœces, but also by stimulating secretion in the colon. The peculiar and copious evacuations, consisting of very fœtid masses, continue under the use of this medicine for many weeks together, so that the quantity evacuated exceeds the quantity of food taken into the system, and this with evident improvement of all the symptoms, especially of the tormenting sensation of anxiety. I will adduce one case only, where the effect of this remedy was most remarkable. A sensible, plethoric young woman, the mother of two children, fell into melancholy with a tendency to self-destruction. In order not to trouble her husband, she kept her thoughts as long as possible to herself, until at last in an attack of the deepest grief, she confessed to him her sad condition, and her qualms of conscience. The physician ordered remedies against the sluggish state of the bowels, but without thereby producing any alteration in her mental state. Thereupon I was called into consultation. I ordered *Ext. aloes aquosum*, with some tartar emetic, and in a few days, after the evacuation of many masses, the patient became calmer. The menstrual discharge had already been twice absent, so that it was possible she might be pregnant, and as in a former abortion, and also during pregnancy, there had been a great tendency to hæmorrhage, it was necessary to be cautious about the continued use of the aloes, and it was resolved to endeavour to effect our object by other remedies. The patient took rhubarb, senna, neutral salts, and had through them daily, but no longer so fœtid, stools; but her melancholy and depressed condition again appeared in a greater degree. In the third month a copious hæmorrhage came on, which made us fear an abortion, but the loss of blood was subdued, and no abortion occurred, on which account we were doubtful as to the existence of pregnancy. After some time we again gave the aqueous extract of aloes with tartar emetic, and the consequence was that the increased melancholy and feeling of anguish again diminished, and the patient was more easily diverted from her thoughts. After a time we were clear as to the reality of pregnancy. Fearing another hæmorrhage, from the aloes, I again tried rhubarb,

I have seldom seen much good effect from rhubarb; it appears to act too much on the muscular structure, and on the strictures of the colon, causes watery stools which alternate with constipation, and generally as is known, leaves constipation after its use.

The decoction of Rhamnus frangula does not give rise to colic which senna so easily causes, and the motions pass off in a more solid condition. The medicine is on that account peculiarly suited for a long continued employment. From aqueous extract of aloes, the Rhamnus frangula is distinguished by its more tonic effect, and also by the evacuated masses not being so tenacious, dark-coloured and fœtid, as one sees them discharged by the use of the aloes, to the great relief of the patient. Therefore, although in many case the Rhamnus frangula acts very well, I must still give the preference to the aqueous extract of aloes combined with some tartar emetic, and administered in repeated small doses, in the cases where it can be borne. I order four to five grains in sixty pills, of which two to four are to be taken five times a day.

On the addition of anti-spasmodics and other drugs to the extr. aloes aquosum I have already expressed myself above.

That in sluggishness of the bowels and close strictures of the colon, and also in hæmorrhoidal troubles, leeches to the anus may act very well, scarcely needs further setting forth. Laxatives generally act much better afterwards, so that one often succeeds with small doses, when previously larger doses, or even drastics, had been administered in vain. I have then frequently seen a neutral salt act. The leeches also cause a strong derivation from the head. After the dropping off of the leeches, the patient should

jalap, and other purgatives, to which I added some tartar emetic. A daily action of the bowels was thus produced, but the melancholy recurred more severely, and we were obliged again to have recourse to the aqueous extract of aloes. Through it a perfect cure was obtained, and that before the delivery, which passed off quite favourably. Twelve years afterwards a fresh attack of melancholy occurred, and I was again called into consultation. The same remedy was ordered, after that the violent congestion had been diminished by cupping, and after the evacuation of copious masses, a remission of the melancholy immediately occurred. On the occurrence of the monthly period the physician left off the remedy; then the melancholy increased, and a week later I found the patient in a very depressed condition. The Ext. aloes aquosum again showed service, the patient quickly recovered, and I allowed the remedy to be still continued for some time in smaller doses. The sudden death of a child, which occurred a few weeks afterwards, caused distension of the abdomen, sluggishness of the bowels, and a melancholy tone; but all these symptoms vanished in a few days after the aloes had been given in the previous doses.

sit on the night-stool exposed to the vapour of hot water.* Sluggishness of the bowels is sometimes dependent on an affection of the spinal marrow, so that the intestines are as it were in a paralysed condition; then extr. nuc. vomicæ, combined with extr. aloes aquosum, is suitable. But if we have to deal with a chronic myelitis, or at least with a state of congestion, then the action of laxatives will be assisted by cupping the back.

If large masses are accumulated in the colon, which may be known by distension of the belly and a peculiar feeling of heaviness and pressure in the region of the transverse colon, then castor oil is an excellent remedy, which, on account of its efficient and at the same time gentle action, deserves to be preferred to all other drugs. Still many patients take this medicine only unwillingly.

Some patients obstinately oppose taking any medicine. In private practice we may then have tartar emetic added to their food and drink, in order to regulate the bowels. But the patients are apt easily to discover it; they become distrustful, think that attempts are being made to poison them, and obstinately refuse to take food or drink.

In place of tartar emetic I have sometimes ordered a quarter of a drop of croton oil to be put in the food, and have seen an effect from it in obstinate constipation. But on the other hand, from the inunction of croton oil on the belly, I have never seen any other result than what the mere rubbing of the abdomen would have.

We meet, also, with peculiar idiosyncrasies. Thus, I sought in vain, in a melancholic patient, to act on the sluggish bowels by extr. aloes aquosum; his condition did not improve under this treatment. Afterwards, he took perseveringly senna with tamarinds; through this the bowels became regular, and the patient recovered. Perhaps, in this case, the aqueous extract of aloes was too strong an irritant for the strictures of the colon.

I have never observed any special result from veratrum album and helleborus niger, on which account I have long entirely given up these drugs. In a few cases of habitual constipation, where, as a rule, an alteration of medicine after a time, does good, I have occasionally found scammony useful, but I cannot grant it any preference over other remedies.

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* Only lately an apothecary consulted me on account of melancholy with commencing tendency to suicide. The red face pointed evidently to passive congestion. On account of disturbance of the head the man could no longer overlook his business, indeed could not even write a letter. He had formerly had much bleeding from the nose, afterwards bleeding piles repeatedly occurred, but he had not had these for a long time. On account of sluggishness of the bowels the physician had ordered pills, consisting of two scruples of extr. aloes aquosum and fourteen grains of tartar emetic, in sixty pills, of which three or four were to be taken twice a day. They caused for the most part watery stools, without any relief. I ordered leeches to be applied to the anus, and copious after-bleeding to be encouraged by steam of hot water; from this the patient immediately felt his head lighter, so that he could think again. To promote action of the bowels I prescribed also sixty pills, in which only three grains of tartar emetic and twelve grains ext. aloes aquosum were contained; he was to take three of these five times a day. He could not conceive that this dose would suffice. But, even on the second day, there came four pulpy evacuations, and on account of the powerful effect the dose of pills had to be reduced immediately to half the number. After ten days he stopped them entirely, because there were copious daily stools. In fourteen days he came to me quite recovered, with a face so altered that I at first scarcely recognised him.

In reduced individuals, with irregular bowels, I have often found the Decoct. rad. arnicæ combined with a small quantity of Aq. laxativa Viennensis or some other purgative very useful. In such cases, cinchona is also suitable, if combined with a mild purgative, or if given in pills with a small quantity of ext. aloes aquos. I have often observed, especially when the Rad. arnicæ was given at the same time, that the bowels became regular, and the melancholy vanished. In patients with tendency to piles, I have seen very good results from the continued use of Flores sulphuris, with or without cream of Tartar. But the medicine must be taken in the morning, for many persons suffer from sleeplessness if they take it in the evening.

Lastly, clysters are also very effectual in promoting action of the bowels. But we must not forget that the often sensitive large intestine is directly irritated by them. In aid of purgative medicines, the ordinary clysters are sufficient. Daily clysters with castile soap, or with soap and oil, or even of cold water alone, prove useful in severe congestions and act as tonics.

By no means seldom there is considerable irritation of the brain in melancholy, and such excitement of the patients that the cerebral symptoms play the most important part. Then the continued use of tartar emetic in small doses is generally suitable in order to calm the patient and to regulate the bowels. We must also distinguish well, whether the greater liveliness is only the result of that increased sensibility, which is found in weak constitutions, or whether an active congestion of the brain lies at the root of it. Only in the latter case is tartar emetic indicated, with or without cupping; here the same treatment as for idiopathic mania is suitable.

Now and then there is present at the same time, induration and enlargement of the liver and the spleen, which are manifested by enlargement and hardness of the belly. In such cases I have found iodide of potassium very effectual; under its use, not only did the distension and hardness of the belly disappear, but also the chronic melancholy.

In several cases of melancholy with sluggish bowels, and so-called constipation, I have found the Kissingen water at the spring very effectual, sometimes also the water of Homburg. The waters brought from those places accomplish very little, they appear to lose their strength by transport. But the journey to a strange place, and the diversion in it, may also conduce to recovery.

Not rarely, patients with this form of melancholy are driven to suicide, or they absolutely refuse to take any food or medicine. The abstinence generally ceases after some days; but in many cases, it cannot be recommended to wait any longer.

Then the feeding tube, to which, through hinges, one can give any kind of curvature desired, to be introduced by the nose, has always served me. Often a single introduction of it succeeds in convincing the patients that they cannot in this way attain their object, and they no longer resist taking food or medicine.

SECTION 6.—*Melancholy proceeding from the Sexual Apparatus.*

This form of melancholy corresponds in many respects with that which proceeds from the colon, and the two forms are often in connection with one another. Nevertheless, the two forms are for the most part clearly distinguishable from each other by definite signs.

I have already remarked (see page 125) on the close connection of the blood vessels and nerves of the left colon with those of the uterus and vagina in the female, and with those of the vesiculæ seminales in the male, and have accordingly referred it to this that congestions of the large intestine and of the left colon, may give occasion to onanism, as conversely, onanism may again induce congestions of the colon, strictures of it, and sluggish bowels, with all the consequences of the latter. The affection of the sexual apparatus, especially onanism, exercises a decided influence on the whole course of the melancholy, and in a therapeutical view, deserves the fullest regard.

The psychical basis of this form of melancholy is sorrow, dejection, self-accusings, as in the form proceeding from the colon sinistrum; but with it there is also seen something peculiar. The patient, melancholic from the large intestine, has to do with imaginary misdeeds—he is a wicked man who has squandered everything, or who shall appear before the judge; the other, on the contrary, considers himself sinful—"he is forsaken by God, who can never forgive him his misdeeds; he is lost eternally." In a word, the depressed tone of mind here passes over into religious melancholy; all afflictions have a religious colour.

This peculiarity I have in my long experience so often and so constantly observed, that I venture to express my conviction, that we should rarely err, if in a case of religious melancholy we assumed the sexual apparatus to be implicated, either through onanism or through other causes. In patients with religious melancholy, in the Utrecht Institution, I have by accurate investigation often enough convinced myself, that the austerely religious opinions to which they had previously attached themselves in no way arose from sincere piety, but much rather from the patients having given themselves up to onanism, or having been affected with other derangements in the sexual sphere. In youthful individuals suffering from religious melancholy, I have frequently discovered the previously practised, and still persisted in, onanism, although on the first interrogation of the parents, or even of the patients, the thing was absolutely denied.

However religious melancholy does not always follow onanism, and conversely we must not conclude that where the melancholy has no religious hue, or where no tendency to fanaticism exists, onanism cannot have preceded; but certainly in onanists, only rarely do cases of insanity occur in which there is not a decided religious colouring. In such cases the onanism often proceeds from previous idiopathic mania, and irritation of the medulla oblongata. Again, in other cases, through frequent onanism an excited maniacal state is induced, which eventually, if the cause does not cease, passes either into religious melancholy or even into dementia.

In many cases onanism, amenorrhœa, and other morbid states only occurred secondarily, after preceding congestion of the rectum and colon; in other cases, on the contrary, the existing excitement and irritation of the sexual parts, had induced sluggishness of the bowels, hæmorrhoidal molimen, and congestion of the colon, constipation was more seldom absent.

Religious melancholy displays itself somewhat differently in different individuals, according to age, sex, and diversity of cause, by which the affection of the sexual apparatus was called forth; but the key note is everywhere the same.

Much the most frequent cause is onanism, of which we cannot be too mindful, and we must take good care that we are not put off the right scent by audacious denial.

If one perceives in a young man a certain shyness and an evasive and cast-down look, a dull irresolute character, which are soon accompanied by stupidity and confusion of head and weakness of memory, then one must be mindful of this sad vice. In addition to this, there is an inconstancy of character and an inconsistency of demeanour according as the unhappy tendency is indulged without restraint, or as in some degree a check is put to it. All onanists like to lie in bed in the morning. Also, fear of man often arises; they think that everyone on the way looks at them, complain of it, allow themselves to be mislead by all kinds of suspicion and perverted imaginations. If there occur, moreover, fanatical notions and self-accusations, then we can have scarcely a doubt as to onanism. One finds generally, also, an irregular circulation, the hands cool yet bedewed with sweat, the head hot, especially the neck and back of the head or the vertex. Biting of the nails and scratching the fingers from which numerous small hang-nails arise, also occurs in other forms of melancholy, but most frequently, however, in onanists. Sluggishness of the bowels also belongs to the phenomena of onanism.

Many enumerate emaciation among the unfailing consequences of onanism, but incorrectly; such individuals often become somewhat bloated in face from the chronic congestion of the head. But on the other hand, the dull look is for the most part quite characteristic. The diminution of the intellectual power passes at last into dementia. This stupefying of the intellect proceeds, as a rule, more rapidly in young persons; it also occurs more quickly and intensely in the male sex.

The imbecile condition, or the dementia from onanism, moreover, displays itself differently from the similar condition after idiopathic mania and meningitis, and the distinction is of importance. Through the persisting venous congestion, the vessels become enlarged; a more passive condition, and a pressure on the brain, together with exudation is induced, but the grey substance does not degenerate so rapidly. I have, therefore, seen dementia, occurring from onanism, disappear in a considerable degree, as soon as the exciting cause was stopped by proper treatment. In idiopathic mania, on the contrary, a more acute inflammation of the membranes of the brain comes on, and the dementia becomes incurable through it. Very often hallucinations also come on, especially of the hearing, as consequences of onanism. If they appear at the commencement of the illness, when they are generally more rare, then the prognosis is very unfavourable.

Epilepsy also, is a much more common consequence of onanism than we are accustomed to consider it. I have very frequently had to refer the origin of this disease to preceding onanism. On inspection of the Dutch Institution for the insane, at least during the time when it was still in a very sad condition from absence of the necessary control, I have repeatedly made the observation that the number of epileptics in the several institutions stood in a corresponding proportion to the number of onanists therein, indeed that that vice, from failure of all control in some institutions was in horrible activity. Since the better managing of the Dutch Institutions for the insane, there are no longer so many epileptics to be found in them.

The treatment of onanism is a very thankless business, because it is often nearly impossible to prevent by careful watching, the continued practice of the vice. One moves then in a circle, which is not easily broken through. The constantly repeated excitement of the sexual parts, causes continually renewed congestion of them, and the accumulation of blood in the, at last, habitually distended vessels, induces new excitement and inclination to onanise, which even the best resolutions of the patient are not sufficient to resist, so that he, like the drunkard, is irretrievably impelled to his destruction. But if he has still enough strength to withstand the impulse, then, not uncommonly, frequent nocturnal pollutions ensue, to which he perhaps succumbs, if a careful treatment does not set a limit here.

We must in the very first place seek to discover what has given occasion to the onañism, or through what, the strong excitement of the sexual impulse is kept up. Bad example, improper reading, and seducement are not always at the bottom—often hæmorrhoidal congestion, or plethora and irritated condition of the medulla oblongata, are the cause.

When hæmorrhoidal congestion spreads to the vessels of the vesiculæ seminales, in which case the bowels are mostly sluggish, then gentle *resolventia* are suitable, often leeches to the anus, or yet rather to the perineum, cold washings and sitz-baths, especially also flowers of sulphur.* If onanism is only in commencement, then also the continued use of dilute sulphuric acid acts well, with at the same time spare diet, especially in the evening. If in such cases we can diminish or entirely remove the hæmorrhoidal congestion, then the principal irritation which impels to onanism is absent, and the unhappy patient is able more easily to resist the temptation.

Sometimes the cause of onanism lies rather in congestion of the medulla oblongata. I have before remarked that when the brain and the medulla oblongata are irritated in idiopathic mania, a very lively sexual impulse is generally present. Further, I have observed in an epileptic, that by repeated cupping with the scarificator, followed by an issue in the neck, the frequent pollutions ceased at the same time as the epileptic attacks. But on the other side, also, excitement of the sexual parts and onanism exercise a reflex action on the medulla oblongata, which is frequently enough manifested, by increased temperature in the neck or the head, and by spinal irritation, especially on pressure on the upper cervical vertebræ. Cupping with the scarificator, cold washings and douches to the neck, the latter especially in the evening, before going to sleep, can here act very advantageously.

Many authors ascribe to camphor an especial quieting effect. It has afforded me no service in excitement of the sexual inclination or in onanism, and I have in vain employed it in religious melancholy with affection of the sexual apparatus. Only in great excitement of the nervous system, with no simultaneous manifestation of strong vascular action, can camphor act really beneficially.

In obstinate cases, often very much depends on restraining for a few weeks the unhappy tendency to onanism. If we succeed in this, then the constitution in some measure improves, and the patient begins again to control himself. If this is not otherwise attained, I lay a narrow strip of blister spirally round the prepuce and maintain the suppuration; but at the same time, the use of the straight jacket must be continued. In this way, now and then, improvement will be obtained.

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* A remarkable case occurred to me in a preacher, who already, as a student, struggled with onanism, and for this reason resolved on an early marriage. Although he was father of five children, he could not resist the continual violent onanistic impulse, and had again completely fallen into the vice. He believed that he had lost the love of his wife and children, liked to shut himself up alone in his study, was no longer able to direct his affairs, and came to me so helpless and full of despair, that he believed himself also forsaken by God, and that he, such a monster, dared no longer to administer divine service. I listened patiently to the unhappy man, examined his body, and found that hæmorrhoidal troubles and sluggish bowels lay at the root of his malady. By cold washings, especially at the back of the head, repeated several times a day; by resolvents, by flowers of sulphur, and spare diet, I succeeded in perfectly curing this patient, so that he again felt happy as man, as husband and father, and gave proof, by learned treatises, that he was in full possession of his intellectual powers.

Spermatorrhœa, which, according to Lallemand, is so frequent, appears in Holland at least, to be much more rarely observed. In the only case which fell under my observation, cauterisation, after Lallemand's method, did no good.

In girls and women onanism is by no means very rare; it is then often very obstinate and frequently accompanied by hysterical symptoms. Fluor albus is generally present, in consequence of the frequent irritation. If the excited sexual inclination and nymphomania are caused by amenorrhœa and plethora uteri, then leeches to the labia or to the upper part of the thighs are suitable. Sometimes they are even better lower down in the thigh. For the rest we must here keep the general indications in view.*

Among the best remedies in onanism is continuous moderate employment in work, only one cannot generally adopt this expedient, because the onanists are very lazy, and do not readily accommodate themselves to active work.

If once the onanistic tendency is allayed by efficient means, while the patient still appears dull and weak, yet free from congestion of the brain (in which case the employment of stimulants would be unadvisable), and seem as if the transition into imbecility is to be feared, then sometimes the flores arnicæ and radix arnicæ, perhaps combined with cinchona, have afforded me the greatest service. I combined these with moderate work so that the patients got tired, and in the evening soon went to sleep.

In a young man of very pale appearance, the onanistic tendency was removed by cold washings, derivatives in the neck and remedying the retention of the stools; from his false religious ideas, he was afterwards freed by preparations of iron. He seemed at first likely to fall into imbecility but has been completely restored.

In the hallucinations of onanists, derivative measures are suitable, such as an issue in the neck; in acute cases also, cupping with the scarificator.

In melancholy women and girls, not unfrequently a rather obstinate fluor albus occurs; this may depend on onanism, but also on plethora uteri or other causes. Such a fluor albus has a very depressing effect, and contributes to the strengthening of the religious melancholy; congestions of the head occur therewith, as well as prepossessions and stupefactions. If the melancholy proceeds from constipation, or from plethora of the uterus, the depression of spirits will not easily, or not completely, cease, so long as the fluor albus is not removed. Generally, there are combined with it more or less violent pains in the loins, which occur by reflexion on the lower part of the spinal marrow. In some cases the affection of the spinal marrow is then primary, and requires derivative measures and cupping with the scarificator. In fluor albus, as is well known, frequent washing with cold water, to which Goulard water may be added, is serviceable. But in tedious and obstinate cases, injections of lunar caustic solution have proved most effectual with me. No case has yet happened to me in which the complaint was not immediately arrested by this injection, if no disorganisation had occurred. If there is any syphilis in the case, then I employ solution of sublimate for the injection.

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* In a full blooded married woman, in whom obstinate constipation and plethora of the colon existed, violent nymphomania with unconquerable onanism appeared. By the extr. aloes aquosum, many fœcal masses were evacuated, and recovery quickly occurred. On the whole, however, aloes is less suitable here, because hæmorrhoidal congestion is easily increased by it.

Another very frequent source of melancholy is suppressed or irregular menstruation. But in many cases the amenorrhœa proceeds from a general affection, or is of spasmodic origin. The connection between menstruation and melancholy may be seen in the circumstance that the melancholy is more marked before or during the period. But not unfrequently the melancholy or mania gives way before the period again occurs, and the latter (menstruation) remains absent of itself during the period of convalescence.

Thence it happens that amenorrhœa is not always combined with religious melancholy, but is also often observed with other kinds of mania. But in religious melancholy the amenorrhœa stands generally in a causative connection with the disease, and the recurrence of menstruation is then, as a rule, the beginning of recovery. On the other hand, it is to be regarded as an unfavourable sign if menstruation again occurs, and takes a regular course without any change in the insanity appearing; the disease then generally passes into incurable dementia.

If the amenorrhœa stands in relation with the general disease, then the patients are tormented with the continual fear of eternal punishment, and notwithstanding their religious behaviour and their anxiety for the future, they endeavour to cut their thread of life by suicide: but at the same time, they not rarely think themselves already in hell, and feel convinced that they are suffering eternal torture. Such patients must be carefully watched over, and treatment in their own houses has, therefore, its hazardous side, because here, inspection is not usually so careful as in an institution. Generally the symptoms appear with greater violence before or after the period.

Many patients, in consequence of plethora uteri, imagine themselves pregnant, and lament the disgrace which they thereby incur; but this delusion vanishes with the return of the period.

If religious melancholy begins in the climacteric years, then the prognosis is very unfavourable; generally incurable mischief of the uterus occurs, the plethora of the uterus, and the reflex symptoms depending upon it continue, and make the disease incurable.

The treatment of melancholy proceeding from the sexual apparatus is often difficult and tedious. General noxious causes must be removed as a matter of course. In the chlorotic, preparations of iron often act best towards the removal of the melancholy. Sometimes with constipation and plethora of the colon, amenorrhæa is combined, caused by a state of spasm of the uterus. Then the remedies already mentioned are especially suitable. Sometimes Dover's powder, and particularly morphia, have done me good service, in melancholy, in mania, or even in hysterical nymphomania. The disquietude and the loss of sleep vanished, the confusion of intellect soon assumed a better appearance, and menstruation was again established. On the use of opium I have numerous experiences; through it I have seen the suppressed menses again flow. Also, in vivisections, I have observed the exciting action of opium on the sexual apparatus and on the urinary organs. A horse, on whom 6 drachms of Extr. opii aquosum had been injected into the jugular vein, urinated almost continuously for some hours, indeed, as often as sixty-four times in an hour. On other occasions the sexual inclination seemed to be excited by it. Opium acts also as an exciter of the spinal marrow, but differently from nux vomica; for while the action of nux vomica is most intense in the lumbar part of the spinal marrow, the action of opium is more on the upper part.

Regarding no class of remedies are we so much in the dark as in respect to emmenagogues. Most of them appear to be quite inoperative. Many medicines, reckoned among them, as savine, secale cornutum, act rather on the muscular fibres of the pregnant uterus, and excite contractions of them; but it is doubtful if they also act on the unimpregnated uterus. As is known, a stimulation and a congested state of the ovaries must precede, if the monthly flow is to come on; for, indeed, after extirpation of the ovaries, menstruation is absent; medicines which act specially on the muscular fibres of the uterus, must therefore be simply useless as emmenagogues. In amenorrhœa from inactivity of the vascular system, according to Pereira's assertion, savine acts as a stimulant to the vessels; I have not, however, in a single case seen a definite result from savine. On the continued employment of borax, I have several times seen the period come on; but whether the borax was always the cause of it, I must leave to be established, because this remedy has not rarely also been given quite without effect. Of tincture of cantharides I have no personal experience; I have also observed no certain action as an emmenagogue from extr. aloes aquosum. Still, it may, through its action on the colon, and by the removal of hardened fœcal masses, promote the monthly flow; for after the dislodgement of such masses, the period often comes on of itself, and at the same time with it, an improvement as regards the melancholy. I have also sometimes seen the most brilliant result from cupping, with scarification, in the lumbar region, especially if spinal irritation was present here; in one case the period came on within half an hour after the application of the cupping-glasses. The application of electro-magnetism, especially by the rotation apparatus, in the lumbar region, may also be advantageous in torpidity. In some cases of paralysis of the lower limbs, where electro-magnetism was employed daily, so copious a discharge of blood occurred that I was obliged to discontinue the measure. But I also know cases of amenorrhœa where I have had electro-magnetism applied with good result to the back or to the neck, and to the legs. Once the period occurred immediately, through it, after the apparatus of Junod had been employed without effect. Leeches to the labia, or to the upper part of the thighs, act very well in such cases, if we can have recourse to them. Likewise, also, vapour baths to the sexual parts, in cases where the fluor albus is not too much increased by it. Among the most powerful means is the cupping-boot of Junod; on its employment I observed rapid occurrence of the period, and disappearance of the melancholy. Only its use, especially in private practice, is not easy. Perhaps the boot might be in some degree replaced, if one were for a short time to apply a tight ligature round the thigh, and through it keep the blood back in the leg. Lastly, foot-baths are among the assisting measures most to be recommended.

Of course, in the choice of these emmenagogues one must take into consideration, whether through congestion and irritation of the uterus or of the spinal marrow, with or without simultaneous affection of the colon sinistrum, a spasmodic retention of the menses is induced; or whether, on the other hand, a too weak vascular action or a chlorotic condition lies at the root of it.

In religious melancholy, just as in every other sympathetic mania, one must regard the congestion of the brain and the heat in the neck, as well as the feeling of heaviness and pressure in the head. For the, it is true only secondary, affection of the brain, is yet the immediate cause of the confusion of intellect, and upon its removal depends the restoration. If the brain is too violently irritated, so that chronic meningitis arises, then the melancholy passes into mania or dementia—that is to say, the grey cortical layer atrophys, and with that, the prospect of restoration vanishes. To guard against this unhappy event, we must take care that the brain affection does not attain too high a degree. One accomplishes that, by cupping with scarification on the neck, by leeches and cold applications. In other words, besides employing the measures by which the causes of sympathetic mania are removed, one also sets in operation the means of cure for idiopathic mania.

Hallucinations likewise occur in such cases.* In obstinate, mostly old cases, this melancholy sometimes changes its character,—it forms a definite idea, and we have to do with *demonomania.* The patients then complain of a peculiar feeling in the belly, with colicky pains, and these they ascribe to devils who are concealed in their belly. Esquirol found in one such case the intestines quite adherent to one another, and I have also found that in one instance. It therefore appears that pathological sensations from old adhesions of the abdominal viscera give origin to such ideas, to which neglected education, scanty enlightenment, and superstition may contribute their share. Such cases are, on the whole, rare, and mostly occur in women of the lower class. The prognosis is generally unfavourable.

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* One of the most interesting cases that have come under my notice concerns a young, gentle, but plethoric woman. An anxious mother, she experienced the misfortune, after having for some time suffered from sluggish bowels and constipation, of seeing her child, six months old, die in her lap from convulsions. The violent commotion made her at first indifferent, and she even reproached herself with this indifference: but after a time she believed herself to be dead. She "saw the shops shut, heard people speak of her death, and expected every moment to be laid in her

But melancholy, proceeding from the sexual apparatus may again display different characters according to the constitution, and the special conditions of the patient. Especially does this hold good in puerperal mania, in which not uncommonly the most violent excitement and frenzy alternates with religious ideas and with melancholy. It is necessary to pay attention to the previous delivery as well as to the constitution. Generally even within a few days of the confinement, great liveliness and an excited manner have appeared. Sometimes the outbreak has been induced by a fright or some other unforseen influence. The lochial discharge sometimes ceases; but the secretion of milk may either continue or diminish. The pulse is accelerated, and the excitement of the whole organism generally leads to an outburst of violent fury. The patients tear their clothes, they insult their relations, and not rarely lose all sense of shame. Sleep is absent. Anguish often drives the unhappy persons to attempts at flight, and they endeavour to end their lives by drowning themselves. Religious ideas are for the most part in operation, and at length the condition passes into religious melancholy.

coffin." Now one delusion followed another. She believed herself in hell, her child had not died of convulsions, but she had herself eaten it up; for that reason she was alarmed when she heard people talk of meat or animal food, and would take no meat. For some length of time it was even troublesome to induce her to take food at all. She was, indeed, "dead, and required no food." Her husband and her other relations had died through her, and the persons who passed for them were evil spirits who tormented her by putting on the clothes of her husband and her sisters; everything was only semblance—even the sun was no longer the real sun, but a false one. Men appeared to her to have grizzled faces, or they were shining and had fiery eyes. The senses of the woman, especially the hearing were unusually acute. When at last she was received into the Utrecht Institution, her condition improved under the employment of cupping with scarification, cold applications and shower-baths on the head, as well as extract. aloes aquosum with tartar emetic, through which many indurated masses were evacuated, and she began to have doubts about her ideas: only she could not give up the notion that she had been guilty of a heinous crime. At last she appeared suddenly to lose this depressing feeling, and she was quite happy. Bnt now she saw a halo—a kind of glory around every one, and on that she believed herself on a sudden in heaven. However, this illusion continued only a few days. She had then completely recovered, and she spoke continually of the hallucinations which had caused her so much anxiety. Menstruation had been absent, but appeared again a few weeks after recovery. The great sharpening of the hearing and the hallucinations of sight were now quite gone. At present the woman enjoys the best of health, and is a happy mother and housewife.

Puerperal mania is very rapidly cured by judicious treatment. Yet even here, the removal of the patient from her own home and her reception into a good institution are often pressingly required, or are at least a very active measure, because the patients come, as it were, into a new world, are thereby diverted, and sooner attain that calmness by which recovery must be preceded. The great cerebral irritation requires in the first place tartar emetic in frequently repeated doses, in plethora, or in stronger congestion, cupping with scarification on the neck, and cold applications to the head. The bowels must be acted upon, according to circumstances, by extr. aloes aquosum, or by Rhamnus frangula. If the patients are more nervous, then also opiates may be given with caution. In a few cases I have seen a good result from large doses of camphor with nitre.

SECTION 7.—*Mania proceeding from the Urinary Apparatus.*

A few cases at least have come before me, where insanity appeared to stand in relation with affections of the kidneys and of the bladder.

A merchant from Liverpool, who had been for some days very much irritated, and had drunk whisky, got a catarrh of the bladder with painful and troublesome micturition; the urine was quite thick, and was only evacuated drop by drop. The treatment was directed against enlargement of the prostate. The catheter caused violent pain, and increased difficulty in passing urine, so that off and on, complete anuria occurred. With it came violent nervous symptoms, hallucinations of hearing and, subsequently, also of seeing, further, violent pains even down to the soles of the feet. The patient had large doses of opium and clysters, and an ointment with Ext. Belladonnæ was rubbed into the perineal region. Later he came under Brodie's treatment, by whom he was ordered tartar emetic with cicuta, and afterwards dilute nitric acid. As his condition only got worse the patient came to Holland, and was under my treatment. On his reception into the institution, we first of all sought by gentle persuasion to quiet the excitement of the patient. On account of sluggishness of the bowels castor oil was ordered, and then decoction of althæa with senna and extract. graminis. The urine was quite thick and contained much mucus, and on account of the affection of the bladder, the patient had lime water with Extr. of cicuta, as well as intermediately a decoction of linseed. Under this treatment, the symptoms of catarrh of the bladder rapidly diminished, the urine was clearer and more easily evacuated. Therewith the patient awoke as out of a dream; he was conscious that his former ideas had been erroneous, and he appeared to be quite well. After a short drive he had an attack of orchitis, and he again became somewhat confused; Ungt. mercuriale c. opio allayed the swelling. In the further course of treatment of the patient, a slight aggravation of the vesical catarrh occurred, and immediately the hallucinations were present again. But all the symptoms quickly disappeared through the continued use of aqua calcis, and keeping the bowels regular; in two months the man left the institution quite cured, that is to say, free from all urinary complaints, and free from all intellectual confusion. A year after his discharge I heard that he had remained quite well.

In a case of religious melancholy, occasioned by onanism, I observed further a violent and obstinate catarrh of the bladder, so that the thick, often purulent sediment containing urine was discharged with trouble and pain. The condition improved through decoct. lini with aq. calcis and a little morphia (later some extr. Secalis cornuti was added), and the patient left the institution cured. Left to himself he returned to the vice of onanism, and thus he came back into the institution burthened with a more violent vesical catarrh, and more severe insanity. The formerly employed measures now only produced a lessening of the catarrh, but were not able to remove it entirely, to which also the resistance of the patient to all remedies contributed. An affection of the kidneys supervened, and the man died demented. In this case also the intellectual confusion always increased simultaneously with the increase of the catarrh of the bladder.

In regard to the extr. secalis cornuti, I will also observe, that I have often employed this remedy, which acts specifically on the bladder, in the nocturnal enuresis so frequent in the stage of dementia, with the best results. I have often found it effectual in incontinence of urine in children.

SECTION 8.—*Mania and Chest Affections.*

A close relation between insanity and chest affections is by no means of very rare occurrence. According to Nasse (*Zeitschrift f. psych. Aerzte*, 1818; Heft 1, s. 44), diseases of the heart stand frequently in a causative connection with insanity; this I cannot confirm. Hypertrophy of the heart and valvular affections, lead rather to apoplexy than to insanity; where they are found together with insanity, I should rather believe them to have arisen from the violent emotions, than that they had occurred primarily. In pulmonary affections, on the other hand, in phthisis and pneumonia, the case is different; lung phthisis especially, appears to me to stand very frequently in close connection with insanity.

It is remarkable when in the very same family some of the children suffer from mania or melancholy, and the brothers and sisters who have remained free from these diseases, die of phthisis. This I have observed so many times, that I cannot regard it as a mere accident. Sometimes phthisis and mania alternate; the phthisis appears to remain in abeyance so long as the insanity persists, and after removal of the latter, breaks forth with new strength. Both diseases may however exist simultaneously. The cough is then not nearly so violent, the expectoration is generally less, or entirely absent, this perhaps partly depends on the patient's swallowing the sputa. The phthisical symptoms generally, notwithstanding the increasing emaciation, are less prominent, and the hectic fever is usually not very decidedly developed.

I have sometimes seen a violent hæmorrhage occur quite suddenly in patients who displayed no particular disposition to chest affections. In a plethoric insane girl the hæmorrhage was so copious that suffocation was threatened from it; but after that, within a few days, the insanity disappeared. On recurrence of the latter a year afterwards, no further affection of the chest came on, and a transition into incurable dementia followed.

In a case of religious melancholy, with great excitement and tendency to suicide, where formerly the sexual impulse had been much developed, through tartar emetic, leeches to the neck, and cold applications to the head, convalescence appeared, so that the man was quite convinced of the error of his former ideas, and talked rationally. He had never previously suffered from chest affection, he possessed a strong bodily frame, and could endure fatigue. One day he sat chatting with a friend, and in the act of lighting a cigar he fell down dead. On account of the event being quite unexpected, I insisted on a section, and found the whole trachea and the branches of the air tubes full of blood, although there was no trace of tubercle nor vomica in the lungs, indeed not even adhesions of the pleura could be found. Probably the blood had been poured out at the instant when the man lighted his cigar, so that the blood was drawn inwards by inspiration, for not a drop of blood had escaped outwards. I could not find the spot from which the blood had been poured out, as the vessels were not injected. A large vessel, however, must have been ruptured, so that in a few moments much blood could collect in the air-passages. The right side of the heart was quite empty. The brain appeared pale and anæmic.

A young man suffered from so-called mania attonita, so that for three years he mostly stood on the same spot, staring before him without opening his mouth. I succeeded nevertheless in restoring him completely A year afterwards he married. As a sign of his gratitude, he wished with his young bride, immediately to pay me a visit, and accordingly two days after the wedding he came to me. Here he had violent spitting of blood, which recurred daily in increasing amount. I immediately reminded the physician that this was no ordinary spitting of blood, since the condition always became worse under antiphlogistic treatment. A peculiar alteration of the face and the fœtid breath, led me to diagnose a local gangrene of the lung, a strong decoction of cinchona with dilute sulphuric acid was therefore ordered, and to my surprise recovery occurred. But a year later lung phthisis developed itself and proved fatal. The sister of the young man, was likewise attacked with mania, was cured, then suffered a relapse, and lung phthisis at last also put an end to her sufferings.

I have also seen phthisis laryngea in the insane. In a woman afflicted with Demonomania, who was always very unquiet and shrieked aloud, laryngeal phthisis with much coughing, at last appeared, so that even the epiglottis was destroyed and swallowing was rendered very difficult; at last the laryngeal disease killed her. When the cough and the laryngeal phthisis began, the insanity disappeared in this woman.

The cases where lung phthisis co-exists or alternates with mania or melancholy are decisive. More than once I have observed that a far advanced lung phthisis which appeared likely to lead to a speedy death, quite unexpectedly came to a stand still, so that all phthisical symptoms, the cough, the hectic fever, and so forth ceased in a short time. But thereupon a mania or a melancholy occurred, with which the patient who shortly before could scarcely speak on account of the violent cough and copious expectoration, breathed freely and deeply, talked without coughing, indeed even shouted. If then the mania vanished, the phthisis immediatetely reappeared and probably caused death. Sometimes the cough and the insanity alternate several times with one another as the following case, reported by Guislain, shows:—A woman, in consequence of a violent fright, fell into silent melancholy, which remained throughout four years. Then a violent cough appeared which troubled the woman exceedingly; but therewith the melancholy ceased, and in half a year, the intellect was quite normal. After two years the woman was again excited, and relapsed anew into melancholy, whereupon the cough immediately intermitted. In the next year the cough again returned and the melancholy vanished, until the former was again driven out of the field by the insanity.

Such a transition from cough or from phthisis into mania or melancholy appears to point to an alternating susceptibility of the vagi and the medulla oblongata, as I have already remarked in my treatise on the Origin and Formation of Lung Tubercle (*Nederl. Lancet*, 1852, *July en Aug.*) Sometimes the cough, and perhaps also the lung phthisis, may occur as an eccentric symptom, or as the consequence of an affection of the medulla oblongata and of the vagi.

But there is not always an alternation between chest diseases and insanity. Sometimes I have seen melancholy and galloping consumption coexist, so as rapidly to cause death.

I have sometimes succeeded in conducting to recovery mentally-affected patients, in whom the symptoms of an advanced lung phthisis appeared in a very threatening manner, and, indeed, by means of emollients (*e.g.*, decoction of althæa with hyoscyamus) and cod-liver oil. Under this treatment not only did the insanity recede, but also the symptoms of chest disease ceased, and the

Salivation

patients completely recovered. Thus, I know one such patient who now for more than ten years has performed the duties of a clergyman, and indeed without the least disturbance. I also know several cases where individuals who were already quite wasted, were by this bland treatment not only restored, but became quite stout. Thus in a man, 26 years old, who suffered from hereditary mania, I could only with difficulty, by large doses of antimony, somewhat restrain the great excitement and wildness, and only by means of sulphate of copper, did a little more calmness occur. Then profuse salivation was developed, which is not rarely observed in maniacs, and also may occur without their taking any mercury; the patient had violent cough, with purulent expectoration, red cheeks with hectic fever, diarrhœa, and to crown all, his sad condition was rendered yet worse by the breaking out of numerous furuncles, by which the existing dyscrasia was yet more distinctly characterised. Notwithstanding the great emaciation, and in spite of all the unfavourable symptoms, the patient recovered completely, while taking a decoction of althæa and hyoscyamus, which, on account of the diarrhœa, was now and then exchanged for decoct. salep.* c. opio, and later was replaced by cod-liver oil. He left the Utrecht Institution for the insane in nine months well nourished and strong, and without a trace of chest disease or of intellectual aberration.

I have many times observed that patients in whom insanity coincides with chest disease, are more lively and excited, not only if they suffer from mania but also in case of melancholy, when they then incessantly communicate their mental sufferings to others. Nevertheless exceptions are not wanting, and one even meets some such patients who do not speak a word. I have rarely seen a good effect from tartar emetic in such cases, indeed it has evidently done injury. Mild narcotics, for example, henbane, are most suitable to diminish the great sensibility and liveliness.

SECTION 9.—*Mania erethica Sensilis.*

Under this name I characterise a form of mania, which is distinguished by peculiar symptoms, but has most similarity with some cases of puerperal mania. In it, irritation of the vascular system is less prominent; heat of the head and the other signs of congestion are only moderately developed, if not altogether absent; the face is not much reddened, and the tip of the nose does not show that deep colouring which is so characteristic of chronic congestion of the brain; the bowels are generally normal, or there is even a tendency to diarrhœa. But there is a persistent restlessness of the whole body which may increase to fury; nocturnal rest is imperfect, or is completely wanting; in violent attacks, talking, singing, or shrieking, continues without intermission.

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* Orchis morea.

In my experience, this form of mania has generally occurred in delicate, sensitive hysterical girls ; yet it may also be observed, more or less modified by constitution, in men. It rarely occurs in the more advanced periods of life. It is especially important for the physician to be aware that such patients are very little tolerant of purgatives and tartar emetic ; even small doses cause immediately, vomiting or diarrhœa, by which the morbid symptoms are increased, and the excitement is augmented.

In this form of disease, according to my experience, camphor is indicated, generally in combination with nitre. We give eight or 10 grains of camphor in the twenty-four hours, perhaps gradually increasing the dose, according to circumstances; and through this the patients usually become calmer. If there is much irritation of the vascular system, then camphor rather excites, and increases the congestion, and it also acts similarly if constipation demands an acting on the bowels. In melancholy, with mute silence and depression of spirit, camphor has also not been useful to me ; the depressed gloomy disposition is even more increased by it. In an insane man, however, who was quite dull and cast down, and did not bear tartar emetic even in small doses, twelve grains of camphor in twenty-four hours produced greater liveliness, which was again calmed, when sixteen grains were given. I then increased the dose to eighteen grains in the twenty-four hours; thereupon the patient became quite calm, and recovery was induced.

In one case I gave as much as 26 grains to a female patient in the twenty-four hours, and then an epileptiform attack occurred; the previously excited patient was quite quiet and dull, and no longer talked. She was afterwards completely cured by ext. aloes aquosum c. tartaro emetico, which remedy she bore very well.

SECTION 10.—*Intermittent Mania.*

Not uncommonly one observes, especially in idiopathic mania, that the patient is better every second day, so that, more or less clearly, a pyrexia and an intermission can be distinguished. I have learnt to recognise this intermittence as nearly always an unfavourable symptom ; it generally indicates a more profound lesion of the nervous system, and an obstinate character of the disease. We must not confound this intermission with *lucid intervals*, which generally occur more irregularly and indicate impending recovery.

In many cases of mania, as well as of melancholy the tertian type appears with the greatest distinctness. The aggravation comes on, in some cases, invariably at the same hour. In one case, where evidently some chronic mischief, probably inflammation or tubercles in the medulla oblongata, lay at the root, the pyrexia appeared even with cold bluish fingers, a small, rapid and contracted pulse, afterwards vascular excitement with considerable cerebral congestion followed, so that everything seemed to point to a masked intermittent.

Physicians were accustomed, therefore, in such cases to have recourse to quinine. I have also tried the remedy repeatedly, and have never seen a cure from it, but only injurious effects. The intermittent character, indeed, was changed, but the patient fell into a state of continuous excitement, or even fury, and I must, therefore, give a cogent warning against the employment of quinine.

How obstinate this form may be is shown by the following case. A lady had seven years previously had a shock from her child being drowned, and soon afterwards she was attacked with periodic melancholy, which came on two or three times a week. This lasted four years, so that the attacks always came every third day. A year afterwards she became pregnant, and the intermittent melancholy was not altered by it; only after her delivery did the patient remain for three days free. My assistance was now demanded, and I became convinced that she was always quite well on the one day, and on the next day was affected with deep melancholy, without any disturbance otherwise, such as confined bowels. Quinine had already been given repeatedly in large doses, and her condition had only become worse from it. I ordered pills of ext. aloes aquosum c. tartaro emetico, as well as leeches to the anus; the violence of the attacks was lessened thereby, and the period again occurred. But the woman did not continue the measures regularly, and the disease increased.

In another case of intermittent mania, the patient every other day about dinner time, fell into great excitement, and at last quite into fury, and towards evening he again calmed down. Then he remained quiet for the next day also, merely showing slight symptoms of mental confusion, while he spoke quite well on many subjects. On account of the typical appearance which so precisely simulated a *Febris larvata*, I consented that an experiment should once be made with quinine, but called the physician's attention to the possible injurious effect of this remedy. My apprehension was so far corroborated that the *intermittent* mania became continuous. The remedy was given, therefore, only for a few days. The periodicity then gradually returned, so that in a few weeks we had again to deal with an intermittent mania. As the case was so obstinate, I wished to make a trial of arsenic as a powerful febrifuge. But with the use of Tinctura Fowleri, the mania again assumed the continuous type, and in a week, diarrhœa and colic already appeared, on which account we were obliged to discontinue it. The man, weakened by the long duration of the disease, now rapidly sank; within a few weeks he had become quite demented, and death soon occurred. In the head, were found the appearances of a general chronic meningitis.

Wherever a distinct intermittence in the attacks was apparent, there I have, nevertheless, seen most benefit from the repeated employment of cupping with scarification on the neck, from setons and the internal use of tartar emetic or digitalis. Even in the cases where, on account of organic mischief in the medulla oblongata, perfect recovery was impossible, I have seen the periodicity vanish through these measures, and an equable calm condition appear. Quinine, given quite at the commencement, had also been prejudicial here, and had to be soon discontinued.

It is another case when a patient with mania becomes attacked with intermittent fever. I have several times observed that the insanity is improved through every attack of fever. In such csses I have, therefore, not had recourse to quinine without pressing necessity, in order not to disturb the curative management of nature. In one case the improvement of the insanity through the attacks of fever was so remarkable, that the speedy removal of the former was hoped for from them. Then the fever suddenly stopped without any remedies having been employed against it. The mania, indeed, was better, but was not yet quite removed; the patient passed a few months more in the asylum, when he was quite cured.

Section 11.—*Effect of Nervines amd Narcotics.*

I know only few medicines whose action is so uncertain and variable as is often the case with camphor. Sometimes it is not borne, because it excites too much, yet this cannot be known with certainty beforehand. Moreover, if it is indicated, then it has often afforded me the greatest service. The variability of the action of camphor appears to me to be caused by its stimulating the vascular system, especially when this is already excited, but at the same time it has a calming effect on the nervous system. On that account, I might compare it with chloroform, ether, and other nervines. When vascular excitement exists, it is consequently heating and therefore injurious; in other instances it may depress the increased sensibility, and through that afford important service. Too small a dose must not be given, because small doses, seem to have an exciting rather than a calming effect.*

In similar cases I have also found opium very effectual, especially in melancholy with great præcordial uneasiness, persistent agitation and sleeplessnees, if at the same time the intestinal canal is very sensitive and diarrhœa easily arises. I have then given half-grain to one grain of ext. opii aquosum in the evening, and have repeated the dose in the morning. In a case, where together with the sensibility of the intestine, there was also congestion towards the head, these congestions disappeared through the use of opium, and the patient recovered.

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* In a very highly excited man who was day and night incessantly hallooing, I had in vain tried leeches, purgatives, and cold applications. By opium the excitement was still more increased, and the pulse rose to 100. I now prescribed one scruple of camphor in the twenty-four hours, in combination with nitre. Through it the pulse sank to sixty beats, the patient became quiet, and the insanity ceased entirely.

I imagine that in such cases the opium diminishes the sensibility of the sympathetic, especially in the neighbourhood of the intestine, in that way lessens the reflection on the brain and spinal marrow, and thus, by allaying the congestion, conduces to recovery. But one must also remember, that opium, as numerous observations and likewise experiments on animals (p. 145) have shown, acts as an excitant on the sexual organs. In a young plethoric excitable woman who suffered from mania hysterica, with sleeplessness and scanty menstruation, one-sixth of a grain of morphia, given in the evening, always allayed the excited and confused condition, but on another occasion when the monthly discharge ceased on the second day, it reappeared on the third day through Dover's powder; soon after that the woman recovered. Later, I was able always to cut short a threatening attack by means of a dose of morphia in the evening; sleep came on, and the mind became free. In this case also tartar emetic was badly borne, even from a quarter of a grain, vomiting occurred. After the woman had for more than half a year enjoyed good health, excitement and attacks of mania again appeared, and now a few hours after a similar dose of morphia, a violent attack of fury burst forth, although the morphia had been preceded by an abstraction of blood. Probably the vascular system and the sexual parts were now too much excited, for as I became convinced, onanism had previously been practised. I have frequently given morphia both alone, and in combination with tartar emetic with good result; but I have found extr. opii aquosum to be the best sedative. The addition of morphia to tartar emetic, caused in many cases, though not invariably, a rapid occurrence of vomiting. Moreover we must not forget that opium in very small doses, for the most part rather irritates, since the sedative effect does not gain the preponderance; the latter occurs sooner from large doses. If an idiopathic cerebral irritation or a chronic meningitis exists, then, according to my experience, opium is injurious, since it increases the irritation of the brain.

I have many times employed the extract of Belladonna as an antispasmodic, with good effect. It acts particularly on the sympathetic nerves of the intestines, especially in combination with extr. aloes aquosum. As a general narcotic, Belladonna has served me just as little as stramonium; I should rather ascribe to it an injurious action.

The strobuli humuli lupuli, among sedative drugs, deserve every consideration. I order a few drachms to be infused in six to eight ounces of water. The remedy is well taken, it promotes sleep and does not produce constipation of the bowels like opium. That lupulin exercises a depressing effect on the sexual activity, as many writers allege, is to me yet very doubtful. Opium, on the contrary, always excites the sexual inclination, and in this may well lie an important difference between these two drugs. Moreover the hop acts also on the vascular system; I have repeatedly observed an increase of the congestion of the head through its use, so that it had to be discontinued. I prefer to order a few spoonfuls of the infusion to be taken several times in the evening; the night is then quieter, and congestion does not so readily occur as when the remedy is given four or five times in the day.

Hyoscyamus has also sometimes served me as a sedative, and it has indeed of itself brought about a recovery, particularly if at the same time a chest affection was present. On the other hand I have only seldom given Aq. Laurocerasi, on account of its uncertainty.

The sleeplessness which is so common a symptom in idiopathic mania, must not be opposed by narcotics which would only have an injurious effect. Sedative narcotics are only suitable when the sleeplessness is a residuum of increased sensibility, without any appearance of excited activity of the vascular system.

On a few occasions I have also given chloroform internally with gum or sugar and water. A calming and stupifying effect is not produced in the same degree as when chloroform is inhaled. However, in a few cases of hysterical patients, I have seen quietude and sleep come on after fifteen to twenty drops taken in the evening. It is not suited for continuous administration, because the dose must be constantly increased.* Of the use of Digitalis in hallucinations I have already spoken (p. 114 *et seq*): but I have often given Digitalis also with good result, in order to diminish the strong excitement, especially when tartar emetic was not well borne. The continued use of an infusion of Digitalis, which according to my experience is more calming than the powder, produced quietude and a depression of the pulse-beat, in great excitement, which could be assuaged by no other means, it is true with preponderating narcosis, fullness of the head, and staggering gait, which symptoms, however, vanished in a few days. But it has appeared to me, that the calming of the patient lasted only so long as the pulse remained at fifty to sixty beats, and that on intermission of the remedy, not only did the pulse-beat again increase, but the excited condition also re-appeared. With tartar emetic it is more rare that the tranquillity attained is lost again on discontinuing the remedy. Thus far Digitalis appears to act only as a palliative, yet much depends on the form of the disease and on the condition of the patient, for sometimes the improvement obtained by Digitalis is permanent.

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* Regarding a lady who suffered from old and incurable religious mania, and who refused all help, the question arose whether carcinoma of the uterus was present. An examination would have been possible only with great resistance and with an outburst of fury. I therefore recommended that she should be put under chloroform: she fell into a sleep and could now be examined without trouble. Strange to say, on awaking she was quite in her senses; she knew that she was ill, and was able to oppose no resistance. But in a few hours she had again fallen into the old state. A second trial had the same result, but unfortunately only of shorter duration.

SECTION 12.—*External Remedies.*

In the therapeutics of different forms of insanity, external derivative remedies have frequently been spoken of, cupping, leeches, issues, setons, incisions of the scalp, and to them I will not again revert. On the other hand, I have yet an important remedy to consider, namely, baths, which are employed as warm, and tepid baths, as douches, as shower and plunge baths.

In private practice baths are certainly difficult to establish; but this remedy acting so powerfully on the skin, is of such importance that in many cases it must on no account be omitted. In many patients the cutaneous exhalation is disturbed and the skin is quite dry; then tepid baths are very beneficial by derivation from the skin. If we combine therewith a cold shower bath on the head, we in a double manner diminish congestion of the head. Only the bath must not be too hot, but merely lukewarm.

Of late Brierre de Boismont has recommended tepid baths, continued for six, eight, or ten hours, in order to assuage the fury of the insane, and I can easily believe that so lengthened a warm bath must relax and depress the activity of the whole vascular system. But there are difficulties in the employment of such baths, for example, even in keeping the water at the same temperature the whole of the time, and therefore they can only seldom be used. Moreover, we possess other external means, *e.g.*, cupping, as well as internal remedies, by which we are able in a simpler manner to calm the excited insane patient.

Cruel and
dangerous
treatment.

Cold baths may also be used, they produce a powerful reaction in the skin, and can again restore its function. In tendency to congestion and to meningitis, and also in epilepsy they may, however, do harm. Also in onanism I have employed the cold bath as a remedy, and as a coercive measure with good effect. Also, merely on the score of cleanliness, baths deserve all consideration in regard to the insane, in whom filthiness is of no rare occurrence.

THE END.

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